ENCYCLOPEDIA
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Hudson Bay
Bering Sea
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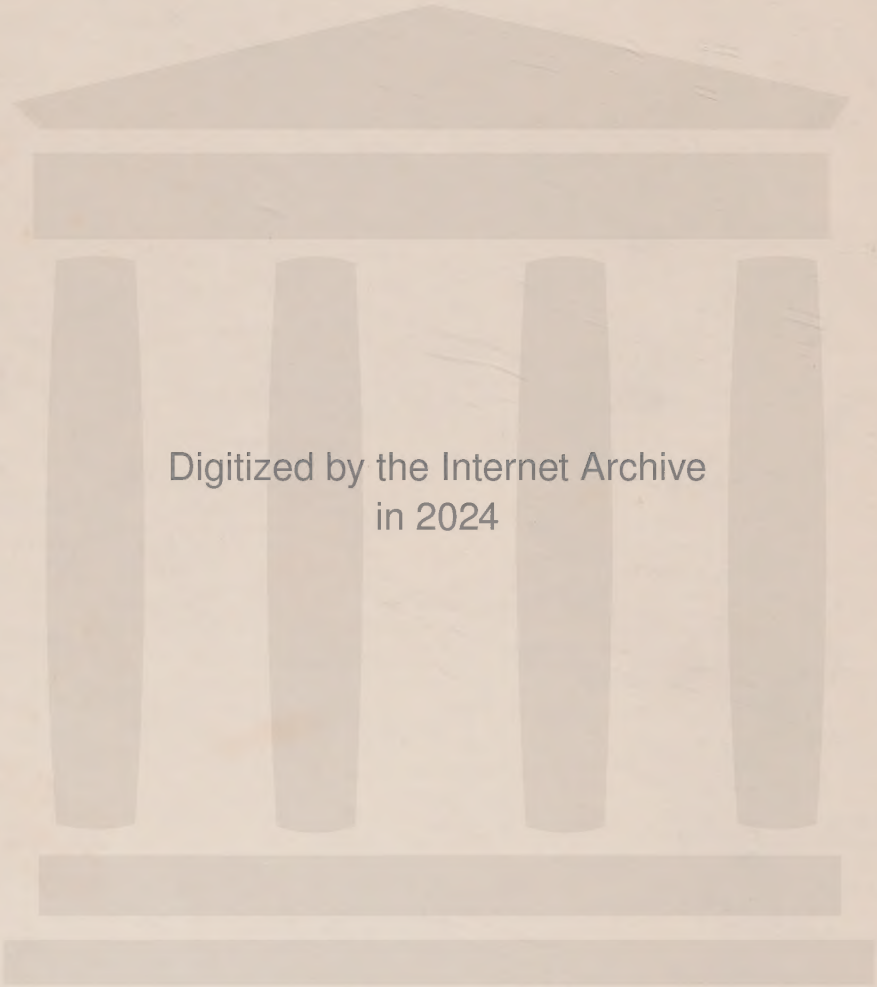
BY HAROLD K. FAYE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RUSSIA—SILIUS

RUSSIA. See UNION OF SOVIET SOCIALIST REPUBLICS for an outline of Russian history from earliest times and an account of the present day Soviet Union; MIDDLE EAST—*Russian Messianism and the Middle East;* RUSSIAN LANGUAGE AND CULTURAL LIFE for articles on Russian language, literature, drama, music, art, and architecture; RUSSIAN SOVIET FEDERATED SOCIALIST REPUBLIC (RSFSR) for a description of the largest of the 16 Soviet Union republics; RUSSO-TURKISH WARS for the history of conflicts between the neighbor countries since the 16th century.

RUSSIAN ARCHITECTURE. See RUSSIAN LANGUAGE AND CULTURAL LIFE—*6. Architecture.*

RUSSIAN ART. See RUSSIAN LANGUAGE AND CULTURAL LIFE—*5. Art.*

RUSSIAN CHURCH. The first conversion of the Rus to Christianity dates from the days of the great Patriarch Photius (820?–891) of Constantinople; a special bishopric seems to have been established in that period at Tmutarakan, near which the modern city of Krasnodar is located (at the Black Sea on the Kuban River Delta). At Kiev, where there was already a cathedral church of the Prophet Elias (Elijah), an organized Christian community existed as early as 945. There were a considerable number of Christians in the retinue of Grand Prince Igor, who had to take an oath in the church at the signing of a treaty with Byzantium in 945. Igor's wife, Olga, was a Christian herself. Our data about this early period are scanty and controversial. Apparently there were links with both Byzantium and the West, and a western bishop was about to go to Kiev. Of decisive importance was the conversion of Grand Prince Vladimir, the ruling duke of Kiev, probably in 989. He made Christianity the official religion in the Russian lands.

Early Organization.—The expansion of the new religion was rather fast, but not without resistance, and probably in many cases conversion was quite superficial. In any case, in the 11th century the church was firmly established in Russia and a regular organization was inaugurated. The church was organized under the jurisdiction of Constantinople, as a special province of the Ecumenical Patriarchate, under the headship of a metropolitan, with residence at Kiev, who at an early date assumed the title "of the whole Russia." Several dioceses (including that of Novgorod in the north) were established under his primacy. Metropolitans were to be appointed and consecrated by the patriarch of Constantinople and most of them were Greeks. In the inner administration, however, the Russian Church enjoyed full independence. The Slavonic language was used in worship and in preaching. Links with the southern Slavs were strong at that time, and it was from Bulgaria that many Byzantine religious and other writings were circulated in Russia. Some new translations from Greek were made in Kiev and elsewhere. The church had a national character from the very start, but the basis was Byzantine, if in a Slavic dress. The great cathedrals in Kiev and Novgorod were already erected in the 11th century and dedicated to Hagia Sophia, like the famous church at Constantinople. The great underground monastery at Kiev, the Caves Lavra, dates from about the same time. How deeply Christianity penetrated the masses at that period it is difficult to say. But on the top level, Christian culture was already flowering, as we can judge by the numerous literary documents of that time, including the remarkable Russian *Chronicle.*

Later Organization.—The Mongolian (Tatar) invasion and conquest in the 13th century accelerated the shift of political and national centers to the north, where Moscow soon became a new focus of national unification. The see of the metropolitan was translated to Moscow in 1328, although for a certain time the title was still "of Kiev and the whole Russia." Certain Russian lands in the south and the west were incorporated in the newly formed Lithuanian dukedom, which ultimately was merged with the kingdom of Poland. For centuries there was a strong political tension between these two powers, Moscow and Poland-Lithuania, which affected the ecclesiastical situation. Finally the church was divided, and an independent metropole was established at Kiev. After the Council of Florence (1439) had agreed on a plan for union between the Byzantine Church and Rome, a formal reason was found at Moscow to sever the link with Constantinople and to proclaim the autonomy of the Russian Church. A new metropolitan, Jonas, was consecrated by the Russian bishops in 1448. This is the date of the factual independence of the Russian Church. It was not, however, formally recognized by any church in the East until the end of the 16th century.

The union with Rome was very short-lived in Byzantium, but a new change radically affected the whole situation. When Constantinople (now Istanbul) was captured by the Turks, in 1453, the Byzantine Empire collapsed. On the other hand, the political importance of Moscow was steadily growing, and the grand duke, or czar, of Russia was

assuming the role of a protector of all subjugated Christians in the Turkish Empire. In 1589 the Church of Russia was officially recognized as an independent patriarchate. Quite different was the situation in the west and the south. Toward the end of the 16th century Poland became one of the strongholds of Roman Catholicism. For various reasons bishops of the Orthodox Church in this realm decided to join Rome, under the condition that the Eastern rite and the existing church organization were to be retained. This move of the bishops was strongly opposed by the majority of clergy and laity, but union was enforced by the secular law (the Union of Brest, 1596) and the Orthodox Church ceased legally to exist in the realm. It continued, nevertheless, and in 1620 new bishops were consecrated, although they were not recognized by the government. The final settlement occurred only in 1632 with the election of the new metropolitan of Kiev, Peter Mogila. The Orthodox Church had to live in those parts in constant tension and conflict with the Uniate Church (the church of Eastern rite, but of Roman obedience), which was strongly supported by the Polish government.

With the annexation of Kiev and other provinces in the south, in the middle of the 17th century, the church of Kiev was incorporated into the Moscow Patriarchate, if not without resistance. The final unification of the church in Russia was achieved only in the 18th century, but the difference between the north and the south, caused by the difference in the historic past, has never been fully overcome. In the late 17th and 18th centuries, the influence of Kiev was overwhelming, despite the political domination of the north.

The main (and tragic) event of church life in Moscow in the 17th century was the great schism, the schism of the so-called Old Believers, who seceded from the main church in protest against the ecclesiastical reforms of the Patriarch Nikon (1605–1681), who wanted to adjust the forms and habits of the Russian Church to the contemporary Greek use. Millions seceded from the official church, were strongly persecuted by the state, and moved to the more remote areas of the realm and even abroad. The new movement was soon split into a number of competing branches, violently opposing each other on various issues. The schism has survived until the present (1955), reduced in size and without its original zeal and impetus. The fear of western influence contributed to the obstinacy of the opposition. And, in fact, by the end of the 17th century, the cultural life of Moscow was strongly colored by the increasing influence of the West, coming chiefly through Poland. It was a preparation for that thorough westernization of Russia which was undertaken by Peter I the Great (r. 1682–1725).

Missions.—The church in Russia has been from the very beginning a missionary body. In the early centuries Russians were concentrated chiefly in the western part of European Russia. Later they began steadily moving eastward and by the late 16th century penetrated into Siberia. The church followed the course of this colonization and in many instances even led the migration (especially in the north). The most impressive example of this early mission was the preaching of St. Stephen of Perm to the Zyrenians (a Finnish tribe) in the 14th century. Not only the native language was used for worship and instruction, but St. Stephen invented a new alphabet. He wanted to stimulate a native literary development, but did not have much success. In the course of the 17th century new bishoprics were created in Siberia and an Orthodox community was established even in Peking, China.

Culture.—Links with the West were never fully missing. Novgorod was for a long period an active member of the Hanseatic League, and western influence was felt there even in the field of religious art and literature. The most striking case of this influence dates from the late 15th century. Archbishop Gennadius of Novgorod decided to produce a complete code of the Bible in Slavonic. Ancient texts were used. But strangely enough, a Dominican monk, Benjamin, probably a Dalmatian, was invited to supervise the edition, and on the whole the final text seems to have been checked not by the Greek original, but by the Latin Vulgate. This Gennadius Bible (1499) was used for the first printed edition of the Slavonic Bible (Ostrog 1581), and at this point once more edited and revised, on the basis of the Greek tradition. Western influence was quite obvious also in Moscow: several of the Kremlin cathedrals were built by the Italian masters.

On the whole, however, the Muscovite culture retained the initial Byzantine inspiration. The cultural effort was concentrated in the field of religious art, and the great art of icon painting reached its climax in the 14th century. The unique perfection of the Russian icon is now commonly recognized. It is usual to put the greatest of Russian masters of that time, Andrei Rublev (c.1370–1430), in line with the Italians, Giovanni da Fiesole (Fra Angelico, 1387–1455) and Paolo Uccello (1397–1475), and the Flemish brothers, Hubert (1366?–1426) and Jan (1370?–?1440) van Eyck. And even in this company Rublev is impressive for the balanced perfection of his art and its absorbing religious depth. This rise of the art reflected a deep spiritual movement in the church, a new monastic revival, started by St. Sergius (1314?–?1392) of Radonezh, founder of the famous Trinity Lavra, near Moscow (now the city of Zagorsk). It is true that this creative level was not retained and one may witness a certain decline of icon painting, especially in the 17th century, but even at that time such great masters can be mentioned as Simon Ushakov (1626–1686) and Procopius Chyrin. What was important was that Russian icon painting was not just an art, but a sort of philosophy in colors. It was an artistic confession of the searching soul. By no means was there a stagnation in the field of culture, if the search found its expression only in the guise of art.

In the field of education, Moscow was in the rear. The first ecclesiastical school was organized in Kiev by Peter Mogila; in 1635 it was given the status of a college. Later this school became the Theological Academy of Kiev, surviving until the Russian Revolution. In the beginning it was a Latin school, the teaching being done in that language. From early in the 16th century until 1686, Kiev was in Poland, where the official language of education was Latin. But both the curriculum and the textbooks were simply borrowed from the Jesuit schools. The famous *Orthodox Confession* of Peter Mogila was made on a Roman pattern, and Roman Catholic influence was strongly felt in his liturgical enterprises. The process was similar to that in the Greek Church of that time. This new Kiev style was partially transferred to the north, to Moscow, where it provoked and promoted confusion and split.

Church and State.—The Byzantine conception of the relation between church and state, as formulated early in the 6th century by Justinian I

the Great and, later in the 9th century, in the *Epanagoge*, was known in Russia from an early date. The theory professed a double authority (and accordingly a double allegiance): *sacerdotium* and *imperium*, or church and state. The assumption was that the two should abide and operate in perfect concord and agreement, respecting and recognizing each other's rights. The technical term for this settlement was *symphonia*. In practice, of course, the theory was never fully realized. It could not protect the church from the occasional or deliberate tyranny of the state, and yet it strongly emphasized an independent nature or character of the church. In Russia this theory had no direct application until the consolidation of the national state. Local princes could not compete with the metropolitan of the whole Russia, backed in addition by the full authority of the ecumenical patriarch. The church was one in Russia, while the principalities were many. The tension grew steadily with the strengthening of the unified state. The Moscow state of the 16th century was often intruding upon the church prerogatives, but the principle of duality and symphony was still faithfully kept.

The 17th Century.—In the 17th century an unusual coincidence increased the factual authority of the church. Under Czar Michael (r. 1613–1645), the first of the Romanov dynasty, the patriarchal throne was occupied by his father, Philaret, from 1619 to 1633. In addition, the czar was a weak man, but the patriarch was a great statesman and of strong character. The crisis came in the middle of the century, under Czar Alexis I (r. 1645–1676) and Patriarch Nikon. It may be true that Nikon used to overstep his rights, but he was acting still within the traditional Byzantine scheme. Nikon's deposition and condemnation in 1666, on the contrary, amounted to a departure from this scheme on the part of the state, not without some influence of the new western conception of the supremacy of the state. Yet, in theory the old Byzantine conception was maintained.

The radical change was effected by Peter the Great. In some sense, the ground for his so-called ecclesiastical reform had been prepared by the previous development of relations between the state and church in Russia. But Peter formally espoused a new theory. He was strongly influenced by the Lutheran conception of an inclusive sovereignty of the local prince (the *Landesherr*) in all fields of national life, both temporal and spiritual. He claimed that the prince was the source of ecclesiastical jurisdiction, so that all authority in the church derived solely from him. By this theory the church had no independent status or standing at all, but was considered just an organ of the local or national state. It was a complete reversal of the Byzantine scheme. Peter finally abolished the office of patriarch, in order not to have any chief bishop, and substituted instead an ecclesiastical college, or board, which had to be regarded as a state institution, deriving its power and authority from the monarch. This college was composed of a number of bishops, clergymen, and even laymen, appointed by the czar and acting on his behalf. A special officer, the high procurator, had to supervise the activities of the college, but he was not a member; he had the right of veto, but he had no vote. This reform met with strong resistance in the church and had to be enforced by pressure and violence. The new body was at once renamed the Holy Synod, but the title could not conceal the nature of the change. Peter could not rely upon the cooperation of the northern bishops and had to select his own people for all offices in the church, chiefly from those who were educated in the south (Kiev and elsewhere) and abroad. His chief adviser and assistant was Feofan Prokopovich (1681–1736), a learned but unscrupulous man, an ex-Uniate and fully dependent upon Protestant sources, both in his theology and in his conception of the state and church relation. The new ideology was formulated in the *Ecclesiastical Reglement* (1721), a document of joint authorship by Prokopovich and Peter himself. It was not only a constitutional act, but also an ideological pamphlet first of all. Signatures of bishops and prelates to the document were extracted by an obvious pressure. Nor could so-called recognition of the reform by the eastern patriarchs, who were led by political considerations, alter the antitraditional character of the venture.

The 18th Century.—The new settlement was imposed by the power of the state, but it was never formally received by the church. The tension was so sharp in the early years of the new regime that it was necessary to make a rule that only persons from Ukraine should be promoted bishops and prelates. This rule was canceled only in the reign of Catherine II the Great (r. 1762–1796). By a careful selection of bishops the crown was able to control the administration of the church, but it could not change its inner structure. The church was in effect in captivity, but inner freedom was never lost. An open attempt to change doctrines and rites made under Peter III (r. 1762) led to the deposition of this monarch. Of course, it was not the main cause of his deposition, but this motive was strongly stressed in the acts of accession to the throne of his wife, Catherine II, and it was precisely this motive that gave to a palace plot the significance of a national event. Catherine II continued the ecclesiastical policy of Peter the Great and it was in her reign that all church estates were secularized and the church was deprived of its financial basis and independence (1764).

The 19th Century.—The new system was finally consolidated only in the 19th century, under Alexander I (r. 1801–1825) and especially Nicholas I (r. 1825–1855). The high procurator, who was originally a kind of state representative or commissar at the Holy Synod, had gradually become an independent head of a large administrative machine, parallel to the synodal administration and embracing various fields of ecclesiastical life. His representatives in the dioceses, without having any definite status in the church itself, in fact could control the whole administration. Bishops exercised their administrative authority through a diocesan consistory, composed of members of the clergy appointed by the Holy Synod, but secretary to this body was an appointee of the high procurator, who played on the local level the same role which the high procurator played in the center. However, no system is ever fully realized in practice, and one should not overlook the passive resistance which was quite strong even in the worst periods of captivity. An open protest was voiced in Alexander II's reign (1855–1881) and radical changes in the relationship between the church and the empire were openly discussed. No major step toward a re-establishment of a more normal situation (from the church's point of view) was taken and in the days of Konstantin Petrovich Pobedonostzev, the high procurator from 1880 until 1905, pressure and control of the state was even increased.

The 20th Century.—It is highly symptomatic

that in 1904 an overwhelming majority of bishops (all of them appointees of the crown) formally insisted on abnormality of the regime. It was decided to convene a council of the church and an impressive plan of reorganization was prepared and discussed. Again no action was taken. The system inaugurated by Peter the Great upon a western pattern collapsed in 1917. The council met in August of that year, the church administration was changed, and the office of patriarch was restored. The patriarch elected was Archbishop Tikhon (Vasili Ivanovich Belyavin, 1865?–1925), previously for several years the ruling archbishop of the Orthodox Church in North America. The council had to work in a strained atmosphere of national catastrophe, revolution, and civil war, which could not fail to color the proceedings. But despite this unfavorable situation, it succeeded in passing an unusual amount of constitutional legislation which established the life of the church on the ground of strict ecclesiastical law. Unfortunately, most of these regulations could never be put in action under the Soviet regime.

Under the Soviets.—The Russian Revolution in 1917 and especially the establishment of the Soviet rule changed completely the position of the church in Russia. It not only was separated from the state (already under a provisional government in 1917), but also was persecuted. The reasons for persecution were manifold. The purpose was obvious: the church had to be deprived of all means of influencing the national life, which was to be rebuilt on an antireligious pattern. For that reason the church was prohibited any educational activity, and of course missionary expansion in any sense was impossible. Destruction of churches, heavy taxation, deportation and execution of clergy and active laymen—all these measures were but details in the general scheme of a complete transformation of the whole community into an irreligious body. The administration of the church was disrupted and for a time no central administration existed. The attempt to construct another organization to compete with the historical church, made by a group of clergy and sponsored by the government, failed to attract any considerable number of believers. Several groups were organized under such names as The Living Church, or The Renovated Church, in the early 1920's. They did not survive for long and ceased to exist long before World War II. In the meantime, order was restored and one of the old bishops, Sergius of Gorki (formerly Nizhni Novgorod) was permitted to assume the functions of an acting head. But his actions were controlled by the government. During World War II the church participated in national defense and for that reason had to be reckoned with. Metropolitan Sergei (1867–1944) was proclaimed patriarch in 1943, but died soon afterward. Metropolitan Alexei (b. 1877) of Leningrad and Novgorod was elected his successor by the council of bishops in 1944. Diocesan administration was to a large extent restored and some of the previously confiscated churches and monasteries were put again at the disposal of the church. Several training colleges for the ministry were established. But, by strict law, "religious propaganda," understood in a wide sense, is still illegal. Moreover, the church authorities are strongly controlled by a new government council on ecclesiastical affairs. And, in fact, the church must comply with the general policy of the state, which is inspired, as before, by antireligious principles. Available information on the actual situation of the church in Russia is incomplete and biased, the topic is very controversial, and no impartial interpretation can be offered. The main problem is: to what extent can a Christian church cooperate with an avowedly antireligious state, without being involved in an inextricable compromise?

Inner Life.—The inner life of the church was affected by the new policy of Peter the Great rather indirectly—through the school. In the course of the 18th century a net of seminaries was created in the country. A seminary was a kind of general high school, but it was administered by the church. There was special emphasis on religious subjects with the purpose of training the sons of the clergy, although not exclusively for the ministry. Up to the early 19th century these schools constituted the only school system in the empire. All these schools were built on the Kiev pattern—as Latin schools. There was no division of educational levels: the same schools included both elementary and graduate classes. This type of school was changed only in the early years of the 19th century when three groups of schools were established: elementary, in small towns; seminaries, in diocesan centers; and theological academies, which were real graduate schools of theology. There were four of the last: at St. Petersburg (now Leningrad), Moscow, Kiev, and Kazan. Russian language had been occasionally used in the 18th century, but not much before the 1840's was it officially approved for the teaching of theology and philosophy. The school had a western character—it was just a local version of a general type of ecclesiastical school in Europe of the 17th and 18th centuries.

Such an educational policy estranged the clergy from the people, both from the simple folks who had nothing to do with this imported scholarship and from the higher strata of the nation which followed another line of development. Nevertheless, the contribution of these schools—including practically all the humanities in their curriculums—to the general culture of Russia cannot be exaggerated. Russian scholarship and learning had its roots in the traditions and experience of the ecclesiastical school, as was true of western learning in the late Middle Ages. Still, there was a tragic rift. The school knew little of the piety of the people. The emphatic tension between learning and piety in the Russian Church could not but distort and impoverish both of them. One may describe Russian theology of the 17th and 18th centuries as a kind of "pseudomorphosis" (to borrow the term from Oswald Spengler). Theology was using an alien means of expression, which had been created and used for decidedly different purposes. It was impossible to express adequately the eastern tradition in terms either of Reformation theology or of that of the Counter Reformation. But it was precisely what had been persistently done, not only in Russia, but also in the Greek Church, until the mid-19th century, if not even later.

The whole situation was considerably changed in the course of the 19th century. The reasons for and factors in the change were manifold. First, there was a revival of contemplative monasticism, starting near the end of the 18th century, on the basis of the strict Byzantine tradition, and examples of its influence in wider fields than only the religious can be traced even in Russian

literature, as in the writings of Fyodor Dostoyevsky and Nikolai Gogol. Much later a rediscovery of the old religious art—of Byzantine and Russian iconography—contributed to the recovery of the ancient tradition. The second influence was the Biblical revival early in the 19th century, which led to a new translation of the Bible in vernacular, ultimately published with the approval of the Holy Synod. At the same time systematic translation of the writings of the fathers of the church was undertaken; the work was conducted by the four theological academies and contributed much to the enlargement of theological perspective. Next was the revival in the wider circles of the Russian intelligentsia, which began in the 1840's among the Slavophiles (of which Aleksei Khomyakov should be especially mentioned) and which reached its climax in the early decades of the 20th century. It was an awakening of a creative approach to religion, and in spite of various aberrations and excesses it revitalized the church. This religious awakening was strongly felt also in various branches of culture: in literature, art, and philosophy. The names of Vladimir Solovyoev, Konstantin Leontyev, Sergei Bulgakov, Pavel Florensky, Nicholas Berdyaev, or even Vasili V. Rozanov, and Dmitri S. Merezhkovski should be mentioned in this movement. They were not exponents of a genuine eastern tradition, and their thought was variously affected by many extraneous influences. But they did much to bring the religious theme to the attention of a wide group of Russian intellectuals. It is now widely recognized in the West itself that Russian religious thought has a valuable and creative contribution to make to the contemporary search for truth. Still, there are more problems and hints than solutions.

Bibliography.—There is no comprehensive book on the history of the Russian Church in English, except the antiquated and popular work of Andrei N. Muraviev, *History of the Church in Russia,* tr. by R. W. Blackmore (Oxford 1842). There is a popular and rather sketchy survey by Walter H. Frere, *Some Links in the Chain of Russian Church History* (London 1918); also a good but biased survey by Pavel N. Milyukov, *Religion and the Church,* part 1 of *Outlines of Russian Culture,* ed. by Michael Karpovich and tr. by Valentine Ughet and Eleanor Davis (Philadelphia 1942). Also consult Klyuchevski, Vasilii O., *History of Russia,* in 5 vols., especially vol. 3, tr. by C. J. Hogarth (London 1911–31).

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RUSSIAN LANGUAGE AND CULTURAL LIFE. These subjects are here treated under the following headings:

1. Language
2. Literature
3. Drama
4. Music
5. Art
6. Architecture

Russian contributions to the arts—especially literature and music—are historically important, though of minor contemporary value.

1. RUSSIAN LANGUAGE. History.—The Russian language is the most important branch of the Slavonic family of languages in the Indo-European group. It is spoken by the most numerous of the Slavic races (the Great Russians), and is an excellent key for understanding the other Slavonic tongues, such as Bulgarian, Serbo-Croatian, and Slovenian. Polish and Czech are also in the Slavonic family, though both have been influenced more by Latin than any other Slavonic language, hence have deviated further from the original Pra-Slavonic. Russian itself should be carefully distinguished from Little Russian or Ukrainian, and from White Russian. Properly understood, Russian, the language of the Great Russians, is simply one of the eastern group of the Slavonic languages, which includes also Ukrainian and White Russian.

The morphological and syntactic development of Russian is made somewhat difficult to trace historically by the fact that Old Bulgarian, spoken by tribes along the Volga, became the ecclesiastical and literary language and remained so until the 17th century. Very early, however, the local spoken Russian of Kiev influenced Church Slavonic (Old Bulgarian) in both pronunciation and vocabulary, and in turn Church Slavonic affected the vernacular. Church Slavonic elements may still be observed in the Russian language, especially in phonetic and morphological peculiarities in words connected with intellectual and religious life. Church Slavonic, in a considerably modified form, of course, has remained the language of the Russian Orthodox Church: the Scriptures were written in it, and it was the language of church services up to the latest times. Thus, the history of Church Slavonic resembles the history of Latin in the Roman Catholic Church.

The earliest written literature, chronicles and judicial documents, employed a language that was an admixture of the vernacular and Church Slavonic. In the 14th century Moscow displaced Kiev as a cultural center, and the local speech of Moscow, a combination of southern and northern dialects, influenced the written language. But Church Slavonic still continued to influence the written language, though on a diminishing scale, until the 18th century. At that time, the great scientist, philologist, and poet, Mikhail V. Lomonosov (q.v.), pointed out in his *Russian Grammar* the dependence of the literary language on Church Slavonic, a fact that had not been scientifically studied before. The literary language now began to fall more in line with the spoken language. Toward the end of the 18th and the beginning of the 19th century, especially through the efforts of Nikolai M. Karamzin and Alexander Pushkin (qq.v.), a literary norm was established.

Characteristics.—Russian is an extremely rich language, and by virtue of its structure capable of expressing the subtlest nuances of thought. Only a great people, said Ivan S. Turgenief (q.v.), could possess such a language. As a member of the Indo-European family, Russian has developed in much the same way as other members of this family. As an inflected language, it resembles Latin and Greek in morphology. The alphabet can be mastered in one lesson. Both Russian and Church Slavonic use the same alphabet, except that Peter the Great simplified the letters of Russian in 1708 by bringing them into closer conformity with the easier Latin letters of the West. Thus there is a current form known as the "civil alphabet" and the Church Slavonic alphabet, which is called *Kirilitsa.* The civil alphabet was simplified still further after the 1917 revolution. There had been 36 letters, not counting the *ë,* which is not a separate letter and rarely occurs in this form except in grammars and texts intended for foreigners. In 1918, the Soviet government issued a "Decree on the Introduction of the New Orthography," which rejected as redundant four letters of the old alphabet. Hence the present alphabet

has 32 letters. The decree effected further simplification: the hard sign was abolished at the end of words; a clarifying differentiation was introduced for spelling certain prefixes before unvoiced consonants; useless variations in the genitive endings of adjectives, pronouns, and participles were abolished; uniformity was given to the two nominative and accusative plural endings of all three genders; the masculine and neuter form of the third person plural pronouns was substituted for the old feminine form; the masculine and neuter form of the word "one" replaced the old feminine form; the genitive singular of the feminine personal pronoun became the same as the accusative. All these changes unquestionably made for simplification, and at the time this article was written Russian had become one of the most nearly phonetic languages in Europe.

The pronunciation of Russian is not difficult. The chief obstacles for a person speaking a western European language is his tendency to make soft combinations hard. Before *e* and *i*, and before vowels beginning with *y*, such as *ya*, *ye*, and *yo*, all consonants, especially the dentals, are palatalized; that is, they are sounded not with the top of tongue pressing against the back of the teeth, but by touching the palate with the tongue higher up. Another difficulty is the hard *l* before *a*, *o*, and *u*. This is not pronounced as in English with the tip of the tongue at the root of the teeth, but rather with the tip of the tongue just touching the teeth; the uvula then vibrates, producing a kind of guttural *l* similar to a guttural *r*. Other sounds offer no particular difficulties. However, a real obstacle for non-Russians learning the language is the variation in stress in Russian words. No definite rule for placing the stress is possible as in other Slavonic languages such as Polish and Czech. The stress is not always placed in the same position in the inflected forms of a single word. A few helpful generalizations regarding stress may be stated: (1) the stress in long (attributive) forms of an adjective is that of the nominative singular; (2) pronouns are usually stressed on the case endings; (3) the majority of nouns are stressed throughout as in the nominative singular. Incorrect stress may sometimes lead to misunderstanding, especially in pairs of words which are spelled alike but stressed differently. Accurate handling of stress in Russian words can come only after long experience with the language.

Russian has comparatively few sounds which do not occur in English, and the variations in sound represented by each letter are usually regular. One peculiarity of the sound system is that there are two sets of vowels: hard vowels and soft or "jotated" vowels. Pronunciation of a hard vowel varies according to whether it is stressed or unstressed and, if unstressed, according to its position in regard to the stressed vowel in the word. A soft vowel, whether it appears initially, or follows another vowel, has the same range of sounds as the corresponding hard vowel but is preceded in each case by the sound "jot." There is a system of vowel mutation governed by definite rules, and also a regular system of consonant mutation, which likewise has its own rules.

The Russian noun has three genders, two numbers, and six cases (a seventh, the vocative, exists only in a few survivals). The genders are declined differently, but their plurals are virtually identical except for the genitive case. The neuter singular differs little from the masculine, but the feminine declensional forms are entirely different. A peculiarity in inflection is that words with soft endings are declined soft throughout. And there are many variations in the genitive and prepositional cases, owing chiefly to a confusion of the historic *o* and *u* declensions. During historic times Russian lost many of its grammatical forms, which can still be studied in Church Slavonic. One of these is the dual, which still exists in a sense after the numerals "two," "three," and "four," when the noun stands in the genitive singular, because that form frequently corresponded to the nominative dual.

In Russian the attributive is transformed into the corresponding adjective or participle. Hence Russian is richer in adjectival forms than the languages of the West. Numerals are fully declined and are quite difficult. Although the nominal declension is complex, its syntactical application is rather simple, since an abundance of cases, each with a distinct function, obviates certain difficulties which are present in a language without grammatical endings.

The verb system is an interesting combination of simplification and complexity. Little has survived of the intricate structure of the verb system in Church Slavonic, with its aorist and multiplicity of past tenses. Only one unconjugated past is left. The ordinary future is a compound of *I shall* and the infinitive, but in a large class of verbs, the present does duty for the future. There are two conjugations, a wealth of participial forms, and gerunds from the old masculine nominative singular. As though to compensate for this relative simplicity in the conjugational system in a highly inflected language, a curious mechanism exists by which these few verbal forms are able to express by means of aspects most of the shades of meaning expressed in English through the tense structure. That is, the five tenses of the Russian verb are divided into two groups called the imperfective and perfective aspects. The imperfective aspect has three tenses: past, present, and future. The perfective aspect has only a past and a future. Each verb has two infinitives, from one of which the imperfective aspect is derived, from the other the perfective. The two infinitives are closely related. One may be formed from the other by (1) the addition of a prefix, (2) by the expansion of one infinitive through insertion of a syllable, or (3) by the alteration of a vowel preceding the infinitive ending. For a few verbs the two infinitives come from different stems. The imperfective tenses indicate iterative and durative actions; the perfective tenses indicate instantaneous actions, or single and complete actions. The perfective aspect sometimes indicates also the performance of the action for a short time, or the beginning of the action, which is itself an instantaneous action. With such an instrument for nice distinction in meaning, it may be readily seen that Russian is capable of distinguishing shades of thought beyond the capacities of most languages. Needless to say, long training is necessary in order to make full use of the fine distinctions in the use of the aspects of the verbs.

Russian does not ordinarily use the passive voice, and it has a very simple way of ex-

pressing the subjunctive with an unconjugated past tense and the addition of a particle. A reflexive is also used, which does not differ from the rest of the verbs, except for the addition of the unchanged reflexive ending.

Borrowings.—The influence of Church Slavonic (Old Bulgarian) on spoken and written Russian has already been pointed out. Other foreign influences may be noted. Tatar has contributed names for many Oriental objects, such as weapons, garments, jewels, and some terms concerned with government. A few words have come from Finnish, and from the more refined literary Polish came a good many words dealing with manners. Many Dutch and German words were imported after Peter the Great "opened his window on Europe." By the 18th century, with the full cultural rapprochement with the West, numerous words had been introduced; most of them were French, but some were English and German. Since then, new loan words from international scientific terminology have entered the Russian language. Since 1917, the Soviets have evinced a partiality for American words, not a few of them slang.

Despite its rather formidable grammar and unfamiliar alphabet, the Russian language is simple and direct and admirably suited to every purpose that a modern language serves. Its literature, both prose and poetry, is among the great literatures of the world. It is spoken by more than a hundred million people, and as the principal language of the Soviet Union, its importance in international intercourse will certainly increase.

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2. LITERATURE. Literary Beginnings.—Medieval literature appeared somewhat late in Russia; the first documents date from the 11th century, about 50 years after the introduction of Christianity. They were in Church Slavonic, which St. Cyril and St. Methodius created as a written language in the 9th century. Church Slavonic resembles Old Bulgarian. Slavonic remained the language of the Russian Orthodox Church and was used for all literary purposes until the 17th century, when it was displaced by the vernacular. Printing also was long delayed; the first book was published in 1564, and printing did not come into general use until the 18th century.

The earliest literary remains are connected with the flourishing cultural development of Kiev, which lasted until about 1200. Religious writings, mostly sermons, were inspired by Byzantine Greek models. But some highly original examples of pulpit oratory have come down to us, such as the excellent *Eulogy on St. Vladimir* by Ilarion, metropolitan of Kiev (d. 1053), and the ornate and eloquent sermons of Cyril, bishop of Turov (12th century). The account of a pilgrimage to the Holy Land by Abbot Daniel the Palmer (12th century) is highly informative, and its whimsically realistic revelations of ecclesiastical trickery recall Chaucer's charming narratives.

Most remnants of early secular literature are chronicles (*letopisi*). These exist only in later compilations, although contemporary entries go back to about 1040. The chronicles contain valuable material for reconstructing the ancient history of Russia, and some have considerable literary merit. One of the best is the *Chronicle* imputed to Nestor (q.v.), 12th century monk and author, which includes some delightful tales of mingled history and popular lore. Another notable secular piece is the *Instructions to His Children* of Vladimir Monomakh, grand prince of Kiev (1113–1125), a document of wise and pious counsel. A considerable body of purely imaginative literature was probably written during the Kiev period, but the only substantial piece to survive is *The Word of the Campaign of Igor* (12th century), discovered in 1795 and first published in 1800. This prose poem tells of the disastrous expedition of Prince Igor against the nomadic Polovtsy of the south. The work occupies a unique place in ancient Russian literature, and its unknown author was clearly a writer of great talent. The rich imagery, diction, and beautiful lyric interludes compare favorably with the best western European medieval verse. Later fragmentary remains in similar vein have been preserved, some of them describing the Battle of Kulikovo (1380), but they are pale imitations of *The Word of the Campaign of Igor.*

After the downfall of Kiev, there was a period of strife between the several city states, and not until the rise of Moscow were conditions again favorable for literary creation. The results, even then, were poor, since the new literature was ecclesiastical—Byzantine in spirit and monotonously formalized in style. Many ser-

mons and lives of saints were written, and churchmen kept up the official chronicles. There were a few interesting exceptions. The *Domostroi* is generally ascribed to Sylvester, adviser to Ivan IV, the Terrible (1530–1584, q.v.), although it was probably written earlier. Essentially a description of household management, this work reveals in stark detail the family pattern of the age: the father is a swaggering lord of creation, to whom mother, children, and servants owe absolute obedience. The most famous among polemical and historical writings is an exchange of letters between Ivan the Terrible and his former general, Prince Andrei Kurbski (1528–1583). These show the czar's talents as a controversialist and master of biting invective. The most significant Muscovite literary performance came from the pen of the Archpriest Avvakum (1620–1681), the leader of the Old Believers in the church schism of the time. In several epistles Avvakum encouraged his followers to oppose religious and cultural innovations, but his chief work is his *Life* (1673), written in the vernacular and revealing a courageous personality and a masterful and original style.

Folk Literature.—Russia has one of the richest folk literatures of Europe, kept alive through centuries by oral transmission. No doubt its remarkable vitality rested partly on the fact that until 1917 illiteracy was the rule rather than the exception among the masses of the population. One very important genre of Russian folk literature is the *byliny*—long narrative poems in unstanzaed, stressed verses. The themes are either historical events, usually related to the siege of Kazan (1552), or the legendary feats of heroes, such as Ilya of Murom. The *byliny* were intoned by professional folk reciters. The oldest extant texts were recorded from oral recitations by Richard James, an Englishman, in 1620. A second collection, attributed to Kirsha Danilov, was taken down in the middle of the 18th century in Siberia and first published in 1804. Later scholars have made collections. M. A. Rybnikov collected many (1861–1867), mostly from the fishermen of northern Russia, where there is a long tradition of *byliny* recitations. *Spiritual Verses* (*Dukhovnye stikhi*), somewhat related to the *byliny* in style, were recited by wandering religious mendicants; they were much influenced in subject matter by Byzantine apocryphal literature. There are also many and splendid folk songs about wedding ceremonials, harvest, death, feast days, superstitions, etc. Perhaps the richest branch of Russian folklore, however, is its folktales (*narodny skazki*). The tales resemble western European fairy tales, except that in Russian prose folktales the fairy does not appear. As narratives they are highly original, artistic, and charming, with all manner of supernatural figures and events. There are many published collections, but among the earliest and the best are those by Alexander N. Afanasyiev, or Afanasev, q.v. (1870) and Nikolai Y. Onchukov (1903). Other departments of folk literature are the charms (*chastushka*)—each is usually a song of four rhymed lines—and popular dramas based on 17th and 18th century literary sources. Folk literature greatly influenced the work of several great Russian poets, Alexander Pushkin particularly, and its themes and imagery have been woven into Russian ballet and opera. Soviet scholars have manifested a renewed interest in the country's rich folklore, and many collections and learned investigations of this material have been made.

Eighteenth-Century Literature.—Peter the Great (1686–1725, q.v.) opened a window to western Europe, and the whole country felt new energizing influences. Peter abolished the Old Church Slavonic script and simplified the alphabet; some of the changes were suggested by Latin script. The vernacular came into use as the written language, although it continued for some time to be heavily influenced by Old Church Slavisms, and foreign loan words and expressions.

Ukrainian and White Russian scholars and clerics now began to introduce a Latinized scholasticism into Muscovite Russia. The forerunner of this development was Simeon of Polotsk (1629–1680) who made many translations from Latin and published books of rhymed didactic verse. Two prelates of Ukrainian extraction and education, however, were more original as men of letters. They were St. Demetrius Tuptalo, metropolitan of Rostov (1651–1709), and Feofan Prokopovich, archbishop of Novgorod (1681–1736), both of whom wrote plays. Prokopovich was also the greatest orator of his day; his *Spiritual Reglement* (1718) advocated the liberal reforms of Peter the Great.

Peter, whose feverish activity was directed toward practical improvement in Russia, cared little for culture as such, and imaginative literature did not flourish during his reign. A historian of the time, V. N. Tatishchev (1686–1750), forecast with some truth that it would take Russia seven generations to catch up with civilization in the West. A book typical of the literature in Peter's reign is *On Indigence and Wealth,* by Ivan Pososhkov (1652–1726), a work erroneously thought to have anticipated the economic ideas of Adam Smith (1723–1790, q.v.).

The reigns of Anna Ivanovna (1730–1740, q.v.) and Elizabeth Petrovna (1741–1761, q.v.) did little to promote literature. For the first time, French neoclassicism began to exercise a marked influence on Russian letters, as seen in the Horatian satires of Prince Antiokh Kantemir (1709–1744, q.v.) and in the dull odes of Vasili Tredyakovski (1703–1769), whose real contribution to literature was an able treatise on prosody. Mikhail Lomonosov (1711–1765, q.v.) was of infinitely greater stature. He is generally regarded as both the founder of modern Russian literature and the father of Russian science. In intellectual and artistic versatility, he was a kind of Russian Goethe. The language of his majestic odes sounds strikingly modern, and his pioneer studies in literary criticism and prosody were very important for his day.

It has been said that Peter the Great created new bodies for the Russians, but Catherine the Great (1762–1796, q.v.) put souls into them. Certainly her reign surpassed Peter's in encouraging cultural development. In a modern sense, during this period, Russian drama really began. It was initiated by Alexander Sumarokov (1717–1774), also an able literary critic and excellent songwriter. Under the neoclassic influence of Voltaire (1694–1778, q.v.) Mikhail Kheraskov (1733–1807, q.v.) won the title of Russian Homer with his vast epic poems: *Rossiada* (1779) on the taking of Kazan by Ivan the Terrible, and *Vladimir* (1785) concerning the introduction of Christianity into Russia. Both of these long narrative

poems were very popular in their day, but their only saving grace for a modern reader is a kind of sprightly dullness.

Better poets than Kheraskov wrote during Catherine's reign. The greatest was Gavriil Derzhavin (1743–1816, q.v.). His *Ode to God,* written in the favorite genre of the age, even surpassed Lomonosov's poetry, particularly in the splendor of its imagery. Of a lower order, but still highly competent poetry, were the clever fables of Ivan Khemnitser (1744–1784) and a very popular adaptation by Ippolit Bogdanovich (1742–1803, q.v.) of La Fontaine's *Psyche.*

Although the French neoclassical influence was dominant during Catherine's lifetime, English and German influences also played a part. Several satirical journals appeared. Catherine herself seems to have started the first one in 1769. It was called *All Sorts and Sundries,* and was inspired by the English journals *Tatler* and *Spectator* of Joseph Addison and Sir Richard Steele (qq.v.). The Freemason and pietist Nikolai Novikov (1744–1816, q.v.) edited a number of satirical journals, in which he boldly criticized social conditions, and in 1773 the empress suppressed all the journals. Catherine affected liberalism only up to the point where it grew critical of her regime. She also suppressed the *Journey from St. Petersburg to Moscow* (1790) and imprisoned its author, Alexander Radishchev (1749–1802, q.v.). This book attacked both serfdom and autocracy, and Soviet scholars now regard it as the starting point of revolutionary thought in Russia.

A foremost literary figure of Catherine's time was Nikolai Karamzin (1766–1826, q.v.), whose most significant service was in reforming the literary language. This reform lay in the direction of eliminating Church Slavisms and in following French syntactic and stylistic models. A group of literary conservatives unsuccessfully opposed these reforms. Their leader, Admiral Alexander Shishkov (1754–1841), argued for the preservation of archaic forms. Under Karamzin's influence and practice, modern Russian literary prose took shape, a monument of which is his well-known work, *A History of the Russian State,* 12 vols. (1818–1826). Influenced by Jean Jacques Rousseau (q.v.) and the 18th century English writers, Samuel Richardson and Laurence Sterne (qq.v.), Karamzin also introduced the sentimental movement into Russian literature. His charming *Letters of a Russian Traveler* (1791) and his tremendously popular sentimental tale, *Poor Liza* (1792) are both in this vein. The most talented followers of Karamzin were Vasili Zhukovski (1783–1852, q.v.) and Konstantin Batyushkov (1787–1855). There is little trace of sentimentality in Batyushkov, for his models were French and Latin elegiac poets and Torquato Tasso (q.v.) ; his verse is classical in form. Zhukovski, however, added to the new sensibility the influence of English and German romantic writers. His mood is primarily elegiac, and his few original lyrics are among the best in Russian. Much of his fame rests on his extraordinary talent for translation; in this art he is hardly surpassed by translators in any language. Some of his versions of English poems are better than the originals, and he made splendid translations of Indian, Persian and Greek epic poetry.

The Golden Age of Poetry.—The bulk of literature written during Catherine's reign slavishly followed French, German, and English models. There was little originality, for Russian writers were still serving an apprenticeship to the authors of western Europe. In the first forty years of the 19th century, however, Russian literature came of age in a wonderful flowering of poetry both original in form and peculiarly native in content.

The towering genius of the period was Russia's greatest poet, Alexander Pushkin (1799–1837, q.v.). Influenced at first by neoclassical 18th century French poets, he soon fell under the romantic spell of George Byron (q.v.). Finally, he struck his own original manner, which was essentially realism in a form lucid and classical. His earliest long poem was *Ruslan and Lyudmila* (1818–1820), a semi-ironic and light romance. A series of verse tales followed—*The Prisoner of the Caucasus* (1820–1821), *The Robber Brothers* (1821), *The Fountain of Bakhchisarai* (1822), and *The Gypsies* (1824)—all more or less inspired by Byron's Eastern verse tales. Meanwhile, in 1823 he began writing his masterpiece, which he did not complete until 1836. This was *Evgeni Onegin,* a novel in verse. He also wrote several plays, a wonderful series of folktales in verse, other long poems, including the inimitable *Bronze Horseman* (1833), a substantial body of prose, and the finest collection of lyrics in Russian. His early death in a tragic duel shocked the country and left unfulfilled, despite his great achievements, the career of a poet who belongs among the foremost writers of the world.

The Pushkin Pleiad was a group of poets of real distinction who were contemporary with Pushkin. The most talented of them was Evgeni Baratynski (1800–1844), a profoundly intellectual poet who aspired to a fuller union with nature. In striking contrast was the bright, clear, convivial poetry of Nikolai Yazykov (1803–1846). Others in the group were Denis Davydov (1784–1836), author of many fine poems on war and love; Prince Peter Vyazemski (1792–1878), a witty poet and acute critic; Baron Antony Delvig (1798–1831), Pushkin's close friend and the author of a few chiseled lyrics; Kondrati Ryleyev (1795–1826), executed as a leader in the revolt of the Decembrists (q.v.), who left a sheaf of noble and eloquent civic poems; Dmitri Venevitinov (1805–1827), whose few philosophical poems promised a lofty poetic future if he had lived; and Fyodor Glinka (1786–1880) whose verse combined deeply religious devotion with marked simplicity. An older poet, apart from the Pushkin Pleiad, was the greatest Russian fabulist, Ivan Krylov (1768–1844, q.v.). His first book of *Fables* appeared in 1809, and he continued to write fables for years. The enormous popularity of his verse arose from its sound common sense and his perfect mastery of words.

A very great genius of this age was Mikhail Lermontov (1814–1841, q.v.). At his best he rivals Pushkin, although he was at his best only in a few perfect lyrics, in certain parts of his verse tales, and in his unsurpassed narrative romantic poem, *The Demon* (1829–1833). He, more than Pushkin, deserves the title of the Russian Byron, though he was outgrowing that manner when he died. The Golden Age of Russian Poetry closed with Fyodor Tyutchev (1803–1873) and Aleksei Koltsov (1808–1842, q.v.). Koltsov was an uneducated and plodding admirer of

Pushkin. His attempts at philosophical poetry are mediocre, but his simple lyrics on the realities of peasant life, the first poetry of this kind in Russian, are excellent. Tyutchev is one of the three or four greatest figures of Russian poetry. His verse began to appear as early as 1836, but critical recognition came much later. His poetry is essentially metaphysical and is based on a pantheistic conception of the universe. Its prevailing pessimism derives from a constant dualism—a struggle between chaos and cosmos. His diction is faultless, and the love lyrics of his later years are cast in perfect 18th century classical style. Many years passed before Russia produced a body of verse in any way comparable to that of the first forty years of the 19th century.

Early Prose Fiction.—Little prose fiction of distinction was written in Russia during the early 19th century. Karamzin's *Poor Liza,* already mentioned, dates somewhat earlier. Vasili Narezhny (1780–1825) wrote *A Russian Gil Blas* (1814) in the realistic English and French picaresque tradition, and a little later Faddei V. Bulgarin (1789–1859) wrote *Ivan Vyzhigin* (1829) in a similar vein. Sir Walter Scott's popularity in Russia inspired historical romances of some merit. Mikhail N. Zagoskin (1789–1852) wrote *Yuri Miloslavski* (1829); Ivan I. Lazechnikov (1792–1869) wrote *The Last Recruit* (1831), *The Ice House* (1835), and *The Heretic* (1838); and Pushkin wrote *The Captain's Daughter* (1836). The Byronic prose tales of adventure of Alexander A. Bestuzhev (1797–1837, q.v.), pseud. Marlinski, won wide popularity. The fiction of Prince Vladimir Odoyevski (1804–1869) and of Aleksei Veltmann (1800–1869) was less obviously romantic. Yet a romantic Byronic hero did not keep Lermontov's prose masterpiece, *A Hero of Our Times* (1840), from being a realistic and acute psychological study of human nature.

The greatest fiction writer of this period was Nikolai V. Gogol (1809–1852), who combined the romantic and the realistic as his special quality. Much in his early collections of short stories, *Evenings on a Farm Near Dikanka* (1831) and *Mirgorod* (1835), is sheer romanticism, but in some early stories and in later tales he combines the romantic with an unusual power for realistic portraiture. After finishing his well-known play *The Inspector-General* (1836), he began work on his great masterpiece *Dead Souls.* Here with realism and sharp satirical intent he creates a series of unforgettable characters and reveals the vulgarity and ugliness of provincial life. The last years of Gogol's relatively short life were darkened by religious mania that undermined his creative powers.

The Rise of the Intelligentsia.—Partly under the philosophical influence of Friedrich W. J. von Schelling and Georg W. F. Hegel (qq.v.), a kind of intellectual revolution took place between 1825 and 1840 that resulted in the formation of a class known as the *intelligentsia,* which later played so important a part in Russian political and social thought. By 1840 this movement had divided into two sharply opposing groups—the Slavophiles and the Westerners. The Slavophiles, strongly nationalist, advocated a return to the virtues and traditions of old Russia; they sanctioned the Orthodox faith and the autocracy of the czar. Important Slavophile leaders were the brilliant religious thinker and poet, Aleksei Khomyakov (1804–1860), the brothers Konstantin Aksakov (1817–1861), and Ivan Aksakov (1823–1886, qq.v.). The leader of the Westerners was the great literary critic, Vissarion Belinsky (1810–1848, q.v.), who felt that Russia's salvation lay in assimilating the progress of Western Europe. The romantic idealism of Belinsky's early critical writing changed later to a demand for a literature of social significance and reform. His famous contemporary, Alexander Herzen (1812–1870), was also a Westerner. Herzen was obliged to leave Russia early in life, and he carried on from abroad, through journalism, a political war against the Russian government. Herzen had artistic talents, and although most of his writing was political and social his brilliant autobiography, *My Past and Thoughts* (1852–1855), and his didactic novel *Whose Fault?* (1847) have high literary merit.

Belinski established a tradition in literary criticism that was followed ably by Nikolai G. Chernyshevski (1828–1889), Nikolai A. Dobrolyubov (1836–1861, q.v.), and Dmitri Pisarev (1840–1868). Carrying still further Belinski's emphasis on social significance in literature, their principal criterion of value in art was its utilitarian value. Dobrolyubov's famous article, *What Is Oblomovism?* (1859), amounts to a criticism of Russian life at the time. The radical trend begun by the Westerners became more emphatic about 1870 with the rise of the Populists (*narodniki*); they stressed service to the people as the only possible atonement for the sins committed by the educated class against the serfs. Their principal leader was the critic Nikolai K. Mikhailovski (1842–1904). Few figures of notable literary ability were in the camp of the Slavophiles. The critic Apollon Grigoriev (1822–1864) was an exception, for his best work is deeply imaginative and keenly perceptive. Nikolai Strakhov (1826–1896) was an able though less profound critic, and the critical and philosophical writing of Konstantin N. Leontyev (1831–1891) showed excellent literary talent.

The Realistic Novel.—The classical Russian school of realism in fiction stems from Pushkin, not only from his prose tales, but also from his novel in verse, *Evgeni Onegin.* Pushkin's style, his realistic descriptions of life on provincial estates, and such character creations as Evgeni and Tatyana all left a deep imprint on later fiction. In some ways Gogol was a continuator of Pushkin, though he also had great originality, especially in style and characterization. His humorous types are delightful and the oppressed character of his famous tale, *The Cloak* (1836), illustrates a new "philanthropic trend" in Russian fiction. One of the earliest writers to reflect the influence of Gogol was Vladimir Sologub (1814–1882), in his book *Tarantas* (1844), a satirical account of a journey from Moscow to Kazan.

Soon appeared the great followers of Pushkin and Gogol, all of whom became known beyond Russia. One of the earliest was Ivan A. Goncharov (1812–1891). Belinski hailed his first novel, *A Common Story* (1847), as a vital contribution to the new realistic school, but his masterpiece, *Oblomov* (1858), became a national classic. The hero Oblomov is a clear descendant of Pushkin's Evgeni, and he became a symbol of sloth and ineffectiveness—faults which exist in Russian character despite generous aspiration and a high sense of values.

An older man, Sergei Aksakov (1791–1859, q.v.), found his proper medium in literature rather late in life, under the influence of Gogol. He published *A Family Chronicle* (1856), *Recollections* (1856), and *Years of Childhood of Bagrov Grandson* (1858). All are essentially reminiscences of his own life and that of his grandparents, though they undoubtedly contain a large fictional element. They are masterpieces of realistic narrative. The author's remarkable objectivity, his pure prose style, and the freshness and vividness with which he recreates scenes of nature have hardly been equalled in Russian fiction.

The crown and glory of the realistic novel were the three giants Ivan Turgenev (1818–1883), Fyodor Dostoyevsky (1821–1881), and Lev (Eng., Leo) Tolstoy (1828–1910, qq.v.). Modern criticism considers Turgenev the least able of the three; he is obviously a continuator of Pushkin. His first substantial work, *A Sportsman's Sketches* (1847–1852), was poetic in style and showed sympathetic understanding of the oppressed serfs. In his two next novels, *Rudin* (1855) and *A Nest of Gentlefolk* (1858), appear Turgenev's favorite "weak hero" and "strong heroine" types—their obvious inspiration is Pushkin's Evgeni and Tatyana. In *Rudin,* particularly, Turgenev, who was a Westerner, also showed his predilection with social problems. In *On the Eve* (1860), Turgenev tried to rid himself of the "superfluous" man type of character and create an active hero. The critics were quick to point out that the new hero, Insarov, was a Bulgarian and not a Russian. The author's final answer to the demands of the critics for an active hero was Bazarov, in his masterpiece *Fathers and Sons* (1861). Radical critics, however, condemned Bazarov as a caricature of a revolutionist. Deeply offended, Turgenev spent most of his later life abroad, and although he continued to write, his later work fell off in power. Turgenev's novels are rich in human experience and social significance; his gallery of heroines, as well as his style, are among the best in Russian fiction. His chief fault was an inability to come solidly to grips with life.

Dostoyevsky was another kind of writer, quite outside the traditional development of Russian realism. His chief debt was to Gogol, who had pioneered in philanthropic fiction; Dostoyevsky followed Gogol's lead in his preoccupation with the downtrodden and oppressed. Thus the hero of his first tale, *Poor Folk* (1846), is a miserable copying clerk, like the hero in Gogol's *The Cloak.* But unlike Gogol, who developed characters through external details, Dostoyevsky analyzes his characters from within. He is primarily interested in their souls. After publishing a series of short stories, Dostoyevsky was exiled in 1849 to Omsk, for association with a radical group; he did not return to St. Petersburg or begin writing again until ten years later. With *Crime and Punishment,* published in 1866, he won widespread fame, and the great novels that followed, *The Idiot* (1869), *The Possessed* (1871), and *The Brothers Karamazov* (1880), made him one of the most celebrated authors in Russia. His novels have been discussed endlessly in Russia and abroad; critics have found everything in them from grotesque, sensational misrepresentation of real life to the revelation of a new Christianity. His titanic characters, such as Raskolnikov, Prince Myshkin, Stavrogin, the Karamazov brothers, and the holy Zosima, undoubtedly reflect his own spiritual tragedy in the search for God. His attempts to find solutions and harmonies for his characters never seem to have the same profundity and terrible realism of their tremendous conflicts and tragedies. Yet in his novels the fusion of the philosophical and imaginative fabric is complete, and his intense inner psychological analysis of characters is unique in world fiction.

In both manner and subject matter, Leo Tolstoy reverts to the Pushkin tradition of realism, but unlike Turgenev, he was not primarily concerned, in his artistic works written before his spiritual change in 1880, with contemporary problems of social significance. Yet the original stamp of this colossal genius was placed on everything he wrote. His early works, such as *Childhood* (1854), *Boyhood* (1856), and *Youth* (1856), have the peculiar flavor of Aksakov's charming reminiscences, but they reveal a realistic grasp on the experiences of life and a potential power of character analysis far beyond the talents of the older writer. These qualities reach their height in *War and Peace* (1865–1869) and *Anna Karenina* (1875–1877). Modern realism has never equaled the achievement of *War and Peace.* Each of the more than five hundred characters has a distinct personality and speaks a distinct language. A Russian critic remarked that even the dogs in the book are individualized. Truth and simplicity, the two canons of Tolstoy's artistic faith, are scrupulously observed. And these same attributes, as well as the author's ecstatic love of life, appear throughout *Anna Karenina.* After his spiritual struggle and conversion about 1880, Tolstoy professed to turn his back on art. Nevertheless, apart from the voluminous critical, moral, and religious works that he wrote after 1880, he produced a considerable body of imaginative literature of great merit, such as *The Death of Ivan Ilyich* (1886), *The Kreutzer Sonata* (1889), *Hadji Murad* (1896–1904), and *Resurrection* (1896–1904); he also wrote several plays. Towards the end of his life he abandoned the psychological and analytical manner of his great period for a simple narrative style that would appeal to the masses. However, everything that he wrote, before and after his conversion, bore the indelible trace of his magnificent talent.

Later 19th Century Literature.—There were other 19th century realistic novelists, not in the same class with the giants, yet writers who have won a high place in Russian literature. The best novels of Aleksei F. Pisemski (1820–1881, q.v.) are *The Petersburgher* (1853) and *A Thousand Souls* (1858); the first depicts uneducated people with rugged virtues and moral strength, and the second is a satire on genteel life. Pisemski's heroes and heroines are vigorously drawn, both in his novels and in his plays. One of the great satirists in Russian literature is N. Shchedrin (real name Mikhail E. Saltykov, 1826–1889). His *Golovlev Family* (1876) is a satirical masterpiece, a social novel that portrays the sordid and crass lives of the ruble-hunting lower provincial gentry. Among many radical journalists and novelists of the 1860's the only outstanding one is Gleb Uspenski (1840–1902); his best work, *The Power of the Soil* (1882), portrays peasant life with humor and great sympathy.

A conservative rare for these times in litera-

ture, Nikolai S. Leskov (1831–1895) was the author of minor classics. His *Cathedral Folk* (1872) is an amusing chronicle of provincial life. In novels and many short stories, he paints a canvas of Russian life, its saints and sinners, always with bright colors, a strong sense of humor, and in a style rich with folk idioms. Drama too claims a high place in later 19th century literature but the same can hardly be said for poetry. The poets were torn between the necessity of writing verse that reflected the civic problems of the day and of indulging in the poet's eternal search for truth and beauty. In trying to fulfill this double mission Apolloni N. Maikov (1821–1897) and Yakov P. Polonski (1819–1898) succeeded only moderately well. Count Aleksei Tolstoy (1817–1875), perhaps the greatest Russian writer of nonsense verse, also wrote exquisite lyrics, and excellent dramas. The most celebrated realistic poet of the period, much read in Soviet Russia, was the radical writer, Nikolai A. Nekrasov (1821–1877, q.v.). His narrative poem *The Pedlars* (1863), and *Who Can Be Happy in Russia?* (1873–1876), are filled with keen, good-humored, shrewd satire and remarkable verbal power, always with undertones of poignant protest. Afanasi A. Fet (1820–1892, q.v.) was as conservative as Nekrasov was radical; his short, condensed lyrics are very beautiful.

Fiction and Poetry (1880–1900).—The towering shadow of Leo Tolstoy dominated fiction from 1880 to 1900. An early member of the new generation which he influenced was Vsevolod M. Garshin (1855–1888, q.v.), the fame of whose brief, creative life rests on his collected short stories. The most notable of these stories, particularly *The Red Flower* (1889), reveal a moral sensitivity and an infinite sympathy for the victims of man's inhumanity.

Among many minor novelists, the only one remembered is A. I. Ertel (1855–1908). His long novel, *The Gardenins* (1898) is still interesting; its picture of family life on a huge estate shows the influence of Tolstoy. Vladimir G. Korolenko (1853–1921, q.v.) was a writer of quite a different type. He was exiled to Siberia for radical activities, and he drew upon his experiences there in his tales. In stories like *Makar's Dream* (1885) he combines a delightful humor with a kind of radical idealism.

Korolenko's great rival was Anton P. Chekhov (1860–1904, q.v.), whose first collected tales met with immediate success when they were published in 1886. His mature period, however, began in 1889, with the publication of *A Dreary Story*. Here we find that mutual lack of understanding among characters and the psychological development of a mood that combine to form the "Chekhovian state of mind" so characteristic of his best-known tales, such as *The Duel, Ward 6,* and *In the Ravine*. These same qualities, along with deeper symbolic overtones, reappear in his famous plays.

Little excellent poetry was written during this decade. The most popular of the civic poets was Semyon Nadson (1862–1887). His brief creative life was dedicated to themes of reform, but he lacked imaginative power and originality of expression. His wide success must be attributed to his smooth, highly quotable, effortless verse. His rival for popular favor was A. N. Apukhtin (1841–1893), whose poetry is filled with a hedonist's regret for the lost pleasures of youth. The verse of Vladimir S. Solovyov (1853–1900, q.v.) rose above this undistinguished level. A brilliant philosophical thinker and a clever writer of nonsense verse, he was yet capable of embodying profound mystical experiences in beautiful lyrics.

Fiction After Chekhov (1900–1910).—Since radical movement of the 1880's and 1890's was driven underground by the czar's secret police, it could find no legal expression in literature. Yet a new force, Russian Marxism, had entered the struggle against autocracy, aided by a growing proletarian class. After the disastrous 1905 revolution, the Duma was established, yet the high hopes of the revolutionists were blasted. A deep disillusionment with the whole radical movement followed, reflected in literature in anti-political individualism, in the growth of aestheticism, and, in some fiction, in the growth of eroticism.

For a time the two most popular representatives of the new manner in fiction were Leonid N. Andreyev or Andreev (1871–1919, q.v.) and Mikhail P. Artsybashev (1878–1927, q.v.). Andreyev had two styles, the restrained, logical style of such celebrated short stories as *The Seven That Were Hanged* (1908), and the shrill, rhetorical style of *The Red Laugh* (1904). In general, the underlying theme of his fiction and plays was physical death and the annihilation of society, morals, and culture. Artsybashev echoed the same theme, and added that of sexual emancipation in his enormously successful and somewhat pornographical novel, *Sanin* (1907).

In striking contrast was the fiction of Maxim Gorky, (q.v., pseud. of A. M. Peshkov, 1868–1936), who raised his voice on behalf of the lost men and women of Russia's lower depths, and at the same time liberated Russian realism from its rather conservative tradition. Although Gorky began to publish long before the 1917 revolution, he lived to become the titular head of Soviet literature, which he profoundly influenced both by example and criticism. Gorky's early stories published in two volumes in 1898, reveal the cruelty and ugliness in the lives of lowly creatures he met on travels through southern Russia. The novels and plays of his second period—*Foma Gordeyev* (1899), *Mother* (1907), *Matvei Kozhemyakin* (1911)—mainly depict the vicious life of provincial Russia and the unhappy lot of oppressed workers. In his last period he devoted himself largely to superb volumes of recollections. After the Soviets came to power appeared his huge masterpiece, *The Life of Klim Samgin* (1927–1938), which presents the history of Russian life between 1880 and 1917. He draws a dark, cruel, and ugly picture, but rising above the gloom there is always a ray of hope for a better and happier country.

Around Gorky and his publishing firm Znaniye were grouped writers who reveled in outspoken realism and went as far toward revolutionary protest as the government would permit. Two of them, Vikenti Veresayev (pseud. of Vikenti V. Smidovich, 1867–) and A. S. Serafimovich (1863–1949), are popular in Soviet Russia through novels sympathetic with the ideals of the revolution. Serafimovich's *Iron Torrent* (1924) is especially popular. Some influence of Gorky appeared in the fiction of Alexander I. Kuprin (1870–1938), whose novel *The Duel* (1905) made him famous overnight. *Sulamith* (1908) and *Yama* (1910), were also quite popular, but they were less powerful. A finer artist was I. A.

Bunin (1870–), who first won notice through verse but who achieved his greatest fame as a novelist. Perhaps his best work is *Sukhodol* (1911), a story of the disintegration of a land-owning family.

The Symbolist Movement.—There was one important reaction in the 1890's and 1900's to writers such as Andreyev and Gorky, and to the dominance of social significance and nihilistic thought in literature. It took form in a definite turning away from civic morality to aestheticism, from duty to beauty. Most participators in the new movement were brilliant intellectuals like Dmitri S. Merezhkovski (1865–1941, q.v.) and his talented wife, Zinaida Hippius (1869–), N. M. Minski (1855–1937), and V. V. Rozanov (1856–1919). Merezhkovski is best known for his trilogy of historical novels (*Julian the Apostate,* 1896, *Leonardo da Vinci,* 1902, and *Peter and Alexis,* 1905), but he also played the philosopher and prophet, developing a curious antithetical approach to religion and morality. Rozanov was a critic and thinker of considerable power; his best works were *Solitary Thoughts* (1912) and *Fallen Leaves* (1913).

This emphasis on aesthetics and mysticism provided an easy transition to the remarkable symbolist movement, partly an offshoot of western European French symbolism. Valeri Bryusov (1873–1924) established the movement with a collection of poems published in *The Russian Symbolists* (1894). Though a weaver of gorgeous imagery, his verse often seems chill and premeditated. The early symbolist Konstantin D. Balmont (1867–1943, q.v.) was a more natural poet, yet there is more sound than sense in such volumes as *Under Northern Skies* (1884) and *Let Us Be as the Sun* (1903). *The Cypress Chest* (1910) by I. F. Annenski, and *Cor Ardens* (1911) by Vyacheslav I. Ivanov (1866–), were regarded in their day as fine collections of symbolist verse; the former was compressed, subtle, and precise; the latter, ornate and metaphysical. One of the most remarkable authors of the whole symbolist movement was Fyodor K. Sologub, q.v., (pseud. of Fyodor Kuznich Teternikov, 1863–1927). He was a refined poet, but is still better known for his famous novel, *The Little Demon* (1907)—its hero Peredonov has become a symbol of concentrated nastiness. Perhaps the most original, and the most difficult, of the symbolists was Andrei Bely (1880–1934), whose real name was Boris N. Bugayev. He was a brilliant critic and poet, but he too is best known for his novels, particularly *Petersburg* (1913) and *Kotik Letayev* (1920). His style in the latter suggests the works of James Joyce. An author often associated with Bely, both as symbolist and prose stylist, is Aleksei M. Remizov (1877–), whose tales (*The Story of Stratilatov,* 1909, *The Fifth Pestilence,* 1912) are of ugly provincial life, and are written in an ornamental and highly mannered prose.

In general, symbolist literature pointed in two clear directions: an aesthetic direction, emphasizing refinement of form, and a religious-mystical direction that usually involved the creation of dream worlds, often realistically described. Both tendencies fused in the work of the greatest of the symbolist poets, Alexander A. Blok (1880–1921, q.v.). His early poems (*Verses about the Beautiful Lady,* 1904) tell the history of the author's mystical "love affair" with a beautiful lady, who continued to haunt Blok's later poems as he went through a long period of black despair. After 1917, he considered the revolution as a cleansing fire that would purify the soul of Russia. This attitude found expression in his greatest poem, *The Twelve* (1918), which is a miracle of revolutionary mysticism and metrical harmony. His radical enthusiasm later gave way to disillusion and chronic despair, and he died in 1921. He was perhaps the greatest Russian poet since Lermontov.

Literature at the Beginning of the 1917 Revolution.—Blok's *The Twelve* was in a sense the swan song of symbolism. The opposition was centered in two new groups: the acmeists, led by the excellent poets, N. S. Gumilyov (1886–1921) and Anna Akhmatova (1888–), and the futurists, the chief adherents of which were Igor Severyanin (1887–1942), Velemir Khlebnikov (1885–1922), and Vladimir V. Mayakovski (1893–1930). The futurists demanded the destruction of all literary traditions in the name of a new flesh-and-blood art that would banish the pale aestheticism of the symbolists and the dry academism of classical writers. In the shadow of this blatant revolt, Soviet literature began, and it was the immensely talented futurist poet, Mayakovski, who first set his impress on the new movement.

After 1917 Mayakovski devoted all his ability and energy to the revolution; his inspiration was the "social command" that he thought every Soviet poet must obey. He wrote many short pieces and plays, but his chief fame rests on several long narrative poems (*150,000,000,* 1919, *Vladimir Ilyich Lenin,* 1924, and *Good,* 1927). He employed very remarkable sound effects and all the typographical tricks of the broken line. No Soviet poet has been more honored than Mayakovski. His only rival in popularity during those early days was Sergei A. Esenin (Yesenin, 1895–1925), who regarded himself as the "last poet of the village." He had a fine lyric gift, but was unable to adapt himself to the new order.

Out of the confusion and conflicting literary demands during the early years of revolution and civil war, certain definite tendencies began to appear. In 1917 the Proletcult was formed to direct the fight for a proletarian culture on an international scale. Two schools of thought promptly arose: (1) the moderate group, supported by prominent government officials and certain writers known as "fellow-travelers," who argued that it was impossible to create a proletarian literature by official decree, and that much of value could still be learned from bourgeois art and culture; and (2) the extremists, soon known as the "On Guard" group, who supported the idea of a government literary dictatorship and called for an uncompromising class-literature. A resolution of the Central Committee of the Communist Party in 1925 declared in favor of the moderate school, and for a time the fellow-travelers were left free to write much as they desired.

The Beginnings of Soviet Fiction.—No Soviet fiction of any consequence was written until about the time of the New Economic Policy (1922–1928). The predominant themes of this early fiction were the stirring events of the revolution and civil war, in which many of the young authors had participated. One of the first successful novels to depict revolutionary violence was *A Bare Year* (1920), by Pilnyak (1894–), whose real name was Boris A. Vogau. *The*

Armored Train (1922) and *The Partisans* (1923) by Vsevolod Ivanov (1895–), treat guerrilla warfare in Siberia. Ivanov's characters are vivid, though astoundingly primitive in their emotions and actions. The extremely popular book *Chapayev* (1923), by Dmitri Furmanov (1891–1926) is an almost documentary narrative of the famous peasant partisan, Chapayev, who commanded a division that saved Uralsk from the White forces. *Red Cavalry* (1926), by Isaak Babel (1894–), is more romantic in its treatment of violence; it is a collection of stories based on the author's experiences with Marshal Semyon M. Budyonny's Cossacks.

On the whole, this early fiction eschewed the psychological analysis of the great 19th-century Russian novelists and concentrated on straightforward realistic narrative. Soon, however, Soviet novelists began to appear who wrote on themes of revolution and civil strife, much in the manner of Leo Tolstoy, Dostoyevsky, and Chekhov. One of the first was Konstantin A. Fedin (1892–). His novel, *Cities and Years* (1922–1924), of a self-centered intellectual who eventually betrays the revolution, aroused considerable interest. The flavor of Fedin's novel suggests Chekhov, and the spiritual doubt of his hero echoes Dostoyevsky. Dostoyevsky is even more in evidence in the fiction of Leonid M. Leonov (1899–), especially in his psychological development of character (see *The Badger,* 1925, and *The Thief,* 1927).

Critics praised Leonov's fiction as a bridge between Soviet realists and classical writers of the past. In a sense the two periods are linked even more strongly in the work of Aleksei N. Tolstoy (1882?–1945), a leading literary figure of Soviet Russia. Perhaps his most distinguished novel is *The Road to Calvary* (1921–1942), which pictures Russia before, during, and after the revolution. The first novel of Alexander A. Fadeyev (1901–), *The Rout* (1926), shows the obvious influence of Leo Tolstoy in psychological insight and unrestrained realism. Fadeyev shows intimate knowledge of Siberia in *The Rout* and again more extensively in his longest and best novel, *The Last of the Udegs* (1929).

Fiction During the First Five-Year Plan. —Under the First Five-Year Plan (1928–1932) a new attempt was made to regiment literature. The Russian Association of Proletarian Writers (RAPP) fell under control of the critic L. Averbakh and a few close supporters, who dictated that the only themes suitable for Soviet writers were industrial reconstruction and agricultural collectivization under the Five-Year Plan, treated against a background of the class struggle. The results of this "planned literature" were for the most part unsatisfactory. Discontent became so great that in 1932 a government decree dissolved RAPP, and this extreme form of literary dictatorship came to an end. A general association of Soviet writers was set up to which all, Communists and non-Communists, were freely admitted.

Although most literature produced during the First Five-Year Plan hardly rose above the dull level of official propaganda or skillful reporting, a few novels had superior merit. Fyodor V. Gladkov (1883–) had in 1927 anticipated the kind of fiction encouraged under the Five-Year Plan with his enormously popular *Cement.* In 1933 he published *Power,* a story of the men and women who built Dneprostroi. In *Sot* (1930) Leonov depicts the establishment of a paper industry, and in *Skutarevski* (1933) he describes a large-scale electrification project. In both books he bores the reader with countless scientific technicalities. Yet in both he shows a typical Dostoyevskian concern for the "inner man" and his spiritual doubts. The subject of industrial reconstruction provided the theme for Pilnyak's fine novel, *The Volga Flows into the Caspian* (1931). *Time, Forward!* (1933) by Valentin Katayev (1897–), is still more lively and artistic. The theme is the competition of shock brigades in pouring cement, and the story is told with verve and excitement.

One of the greatest Soviet novelists, Mikhail A. Sholokhov (1905–), reached artistic maturity during this period. He began his long epic of Cossack life, *And Quiet Flows the Don,* in 1926, but he interrupted it to write *Soil Upturned* (1932–1933), the best novel on the theme of agricultural collectivization during the First Five-Year Plan. Sholokhov finished the *And Quiet Flows the Don* in 1940; the book covers eight years of its hero's experiences and development during the First World War, the revolution, and the civil war. It is an intensely moving story of a man's weakness and strength, and reflects the influence of Leo Tolstoy's wonderful sense of realism and simplicity of character delineation.

Meanwhile, up to this point there was no lack of criticism of Soviet life in fiction. Satire aimed against the vices, foibles, and absurdities of Soviet officials was freely tolerated, provided it did not attack the accepted principles of the new order. Among the best-known satirists in fiction are E. I. Zamyatin (1884–1937), Ilya Ehrenburg (1891–), and Mikhail A. Bulgakov (1891–1940). Katayev's *The Embezzlers* (1928) is a delightful satire on two naively peculating Soviet officials. A number of humorous, popular satires were written by that devoted pair of collaborators, Ilya Ilf (d. 1940) and Evgeni Petrov, whose real name was Evgeni P. Katayev (1903–1942). The most widely read Soviet humorist, however, is Mikhail Zoshchenko (1895–), who has published about ten volumes of short stories and novels. Beneath his humor there is always a deft criticism of the abuses of Soviet life.

Nor were ethical problems—the conflict of the new communist conscience and ideals with traditional views of sex, love, marriage, and the family—neglected in fiction produced during the First Five-Year Plan and even earlier. Two older writers who wrote on such problems were S. N. Sergeyev-Tsenski (1876–), and Panteleimon Romanov (1884–1936). Yuri Libedinski (1898–), in his later works, concerns himself with ethical and social problems, especially in his finest novel, *The Birth of a Hero* (1930); and so does Yuri Olesha (1899–) in his much discussed novel, *Envy* (1927).

Soviet Poetry.—Mayakovski's insistence in the years after 1917 on the socialist function of verse deeply influenced later Soviet poetry. Young authors followed his advice to write poetry that grew out of their participation in social creation and life. Poets, however, like the novelists, were soon split into factions by the conflicting demands made by their communist conscience and by "social commands." Demyan Bedny (1883–1945), an older writer regarded as a kind of poet laureate in the early days of the revolution, was

untroubled by these conflicts; much of his ephemeral verse was satirical and humorous commentaries on Soviet daily life.

Many of the young proletarian poets under Mayakovski's influence, however, often lost themselves in the factional strife. They professed contempt for Russian bourgeois literature of the past; their devotion was to the Communist Party and its aims. One of the first of them, and for a time the most popular, was A. I. Bezymenski (1898–). He wore his party card, he declared, not on his sleeve, but in himself; he asserted in one of his best-known volumes of verse, *That is How Life Smells* (1924), his only real concern was for proletarian realities. After the dissolution of RAPP in 1932, Bezymenski and his strident leftism lost favor. Others among this group of young proletarian poets were Alexander Zharov (1904–), Nikolai Ushakov (1899–1949), Mikhail Golodny (1903–1949), Ivan Doronin (1900–), and Mikhail Svetlov (1903–). Vasily Kazin (1898–), was more talented and wrote in a more genuine proletarian vein. The chief follower of Mayakovski is Nikolai Aseyev (1889–). He honored his master's memory in a long poem, *Mayakovski Begins* (1940), which strengthened Aseyev's position as one of the foremost poets of Soviet Russia.

Constructivism, a somewhat vague movement that developed out of futurism, has for its principal poetic adherent Ilya Selvinski (1899–). Somewhat influenced also by this movement was Eduard Bagritski (1899–1934), a highly talented poet with a fine lyric gift. The "poet's poet" of Soviet Russia, and certainly one of the most distinguished figures in literature, is Boris L. Pasternak (1890–), who began his career under the influence of the Futurists. His long narrative poems, such as *Spektorski* (1926) and *The Year 1905* (1927), seem uncongenial to his special lyric genius, which is more in evidence in his shorter pieces. He is very much of an individualist, and although his language is often obscure and unorthodox in its syntactical structure, it is brilliantly successful in rhythmical effects. An entirely different poet, though sometimes thought of as Pasternak's chief rival, is Nikolai Tikhonov (1896–). From the time of his earliest verse tales (*The Horde,* 1922, *Mead,* 1923) to his later ballads on civil-war themes and his recent poems, Tikhonov has developed his art in an independent fashion, largely as a medium for treating romantic subjects realistically.

In general, Soviet poets have lagged behind fiction writers; they seemed unable to adapt themselves as easily to the new demands made upon literature by the state. The discipline of verse is more severe, and it takes a longer time for forms to crystallize and for faith to take root in the poetic consciousness. The Second World War brought to fuller realization the earlier promise of poetry. Something of a renaissance took place in Soviet war poetry; the older poets are being paced by newcomers such as Konstantin Simonov and Alexander Tvardovski—the latter gained fame even before the war by his brilliant long poem *Muravia Land.* There has been a definite transition from the often difficult, futuristic language of prewar poetry to a simple, uninvolved poetical style, especially in many of the lyrics and ballads on war themes.

Soviet Literary Criticism.—After the 1917 revolution, the old schools of historical-comparative and religious-philosophical literary criticism gave way to sociological and Marxist criticism, which examined literature from the point of view of social and economic evolution. Even earlier a less purely Marxian approach had been formulated by such critics as Georgi V. Plekhanov (1857–1918), V. M. Friche, P. S. Kogan, V. L. Lvov-Rogachevski, and A. A. Bogdanov. Bogdanov became the principal theorist of the Proletcult and was the author of *Art and the Working People* (1918).

This early Marxian literary criticism split into a Right wing (Leon Trotsky, q.v.), Vyacheslav P. Polonski, A. Voronski, I. Lezhnev, and A. V. Lunacharski), and a Left wing (G. Lelevich, G. Gorbachev, and L. Avervakh). Both wings accepted the doctrine of historical materialism, and the critical method of both groups was to interpret literary works through an analysis of the economic and social structure of society. Their differences largely lay in the relative importance of these factors. V. Pereverzev and his followers proposed a variation in the Marxian approach: they maintained that literature became essentially a manifestation of the economic productive process in which every aspect of an author's creative art inevitably will reflect the economic laws of the period in which a writer lives. This approach was quickly condemned as a vulgarized kind of Marxism.

The most serious opponents of the Marxists in literary criticism were the formalists. Most of them are men of brilliant scholarly attainments, and their published works are confined largely to investigations of poetic speech and problems of style (consult B. V. Tomashevski, *The Theory of Literature,* 1925; I. Vinogradov, *The Struggle for Style,* 1937; P. Medvedev, *Formalism and Formalists,* 1934). Their general thesis is that a work of art is the sum of the devices in it, and that "form creates its content."

Since 1932, the universal touchstone of Soviet literary criticism has been "socialist realism." The interpretation and application of the term vary. In its primary sense, socialist realism means a realism that is socialistic, reflecting socialist realities and a socialist mentality. Some later Soviet critics insist, however, that socialist realism must rest on socialist humanism. (See explanation of socialist humanism in USSR-*Philosophy.*) This concept is intended to broaden and ennoble the aims of art. Thus Soviet literature inspired by socialist realism is essentially optimistic: it defines existence as activity, it strives to integrate literature and life, and it directs the changing present towards a more creative future.

Recent Trends in Soviet Literature.—Since 1932 there has been less emphasis in Soviet literature upon themes dictated by "social commands," and greater emphasis upon permanent values and universal constants of human behavior. Although in the fine novels of, let us say, Nikolai Ostrovski (1904–1936), such as *Those Born by the Storm* (1936) and *How the Steel Was Tempered* (1937), a communist conscience is still omnipresent, the works of many other novels give way to more commonplace emotions and human values.

Enthusiasm has increased for historical fiction in which a Marxian approach is employed to reinterpret the past to conform with the present. Historical documentation is usually very careful

and scholarly, and some of the novels are very interesting. In the brilliant historical novel *Peter I* (1929–1934), A. N. Tolstoy, treats the period of the famous czar as one of transition, symbolically parallel to the period of tremendous upheaval in Soviet Russia. Other noteworthy examples of this genre are *Stenka Razin* (1927) by Aleksei Chapygin (1870–), *Tsusima* (1934) by A. Novikov-Priboi (1877–), and *The Brusilov Breakthrough* (1941) by Sergeyev-Tsenski. The historical novels of Yuri Tynyanov (1894–) are quite different. They attempt to re-create literary figures of the past and the age in which they lived (*Kukhlya,* 1925, *The Death of Vasir Mukhtar,* 1929, *Pushkin,* 1934). In most historical novels the patriotic motive is strong, with emphasis on the heroism of the past as an example for the Soviet present. During the Second World War this trend developed into the most violent patriotism. Two themes predominated in numerous war stories, poems, and plays that appeared after June 1941: love for the native soil and bitter hatred for the enemy. Like war literature in other countries, an emotion of fatalism was also apparent.

Since the war, the Central Committee of the USSR Communist Party has severely condemned several prominent Soviet writers for alleged bourgeois tendencies, and has ordered current literary efforts to be more communistic.

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3. DRAMA. Early Drama.—Although the Russian theater has earned a high reputation in western Europe and America, Russia has never produced a body of dramatic literature comparable to Elizabethan drama or the great age of Corneille, Racine and Molière in France. Nor is Russian drama as a whole comparable to the notable body of Russian realistic fiction. Yet some Russian plays merit a place beside the outstanding dramas of world literature, and a number of others are nearly as great.

The earliest Russian drama was imported from the West. Latin school dramas on religious themes were introduced into west Russian schools before 1600, and reached Moscow shortly after. Most of these school dramas were influenced by the medieval miracle and mystery plays. When not performed in the original Latin, they were translated from Latin or from Polish. The only originality in the Russian adaptations is in the comic interludes, where Ukrainian types—the Cossack, the clerk, and the braggart Pole—were introduced. Prelates and clerics brought this school drama from Kiev to Moscow, and before long strolling bands of student actors took it out of the schools and began performing in many parts of Great Russia. The school drama, however, never became widely popular. For one reason, it soon met the rivalry of a second importation from the West—secular plays of German origin. These had a great influence on the history of Russian drama.

A German Lutheran pastor, Johann Gottfried Gregori, living in the German suburb of Moscow, gave the first impetus to this new dramatic development during the reign of Czar Aleksei (1645–1676). In 1672 Gregori organized a troupe of actors to perform before the czar. For repertoire he drew upon printed collections of the plays of German strolling companies which he had known in his youth. These plays in turn had been largely borrowed from the repertoire of companies of English actors performing in Germany. Among the plays selected by Gregori for translation and performance were *The Comedy of Queen Esther and the Haughty Aman* (acted in 1672), which was very likely based on an English interlude, and *Temir Aksakovo* (acted in 1674), which unquestionably had as its ultimate source Christopher Marlowe's (q.v.) *Tamburlaine the Great.*

Under this new impetus, Simeon of Polotsk

wrote a play in rhymed syllabic verse, *Action of the Prodigal Son,* and in the last years of the 17th century the rhymed school drama became predominant. But under Peter the Great secular prose plays translated from the German again came into vogue, supplemented by translations of a few of Molière's dramas. Public theaters were opened, and the old school plays were now played only in the seminaries and academies.

There is little literary worth in any of the early prose dramas, but some literary merit and originality can be claimed for the verse drama. The verse plays of St. Demetrius Tuptalo of Rostov and of Feofan Prokopovich (1681–1736) were real contributions to Russian drama. For example, in the *Nativity Play* of St. Demetrius the dialogue of the shepherds before the apparition of the angels is most attractive for its quality of quaint humor in dealing with things solemn and holy. *Saint Vladimir* (1705) by Prokopovich, a tragi-comedy on the theme of the introduction of Christianity into Russia, is almost classical in conception, and the verse represents the highest poetic level achieved at this time.

Eighteenth Century Drama.—The continuous history of both the Russian theater and drama really begins with Alexander P. Sumarokov (1718–1777) during the reign of Elizabeth (1741–1761). Sumarokov's tragedy, *Khorev,* though influenced by outside sources, was the first Russian play. It was acted before the empress in 1747. To encourage this dramatic development, Elizabeth established the first permanent Russian theater (1756) at St. Petersburg, with Sumarokov as director. Its leading actor was Fyodor G. Volkov (1729–1763), a Yaroslavl merchant who had earlier organized a local troupe of players. Volkov began the great tradition of Russian acting; he was soon ably supported by the famous tragic actor, Dmitrevski (1734–1821), who is said to have studied under Garrick. Excellent acting rendered the poor plays of Sumarokov acceptable, as was so often to be the good fortune of later Russian dramatists. Sumarokov wrote several comedies and tragedies, but they are for the most part slavish imitations or mere adaptations of French neoclassical pieces. Critics called him the "Russian Racine," a sobriquet which perhaps bears less of compliment than implication of plagiarism. He even adapted *Hamlet,* but proudly denied strict adherence to his famous model, declaring: "My *Hamlet,* except for the monologue at the end of the third act and the praying of Claudius, hardly resembles the tragedy of Shakespeare." Yet Sumarokov's efforts have won him the title of "father of Russian drama." He did much to popularize in Russia the best plays of Pierre Corneille, Jean B. Racine, Molière, and Voltaire (qq.v.).

The new interest in drama and theater was furthered by Catherine the Great (1762–1796), who dabbled in playwriting herself. She wrote several satirical comedies, something that passes for a translation of *The Merry Wives of Windsor,* two historical plays that are classified as "imitations of Shakespeare," and still another play that was inspired by *Timon of Athens.*

Little good tragedy was written during Catherine's reign, except for *Vadim* (1789) by Yakov Knyazhnin (1742–1793), which breathes a revolutionary spirit of political freethinking. Comedy, still largely influenced by the French neoclassical manner, but now with a firmer grasp on the realities of Russian life, predominated. Knyazhnin, an imitator of Voltaire, was a prolific writer of comedies, which on the whole are superior to his tragedies. They usually make excellent theater, but are not first-rate in character drawing and dialogue. Perhaps his best comedies are *The Queer Fellows,* a satire on Russian Gallomania, and *An Accident with a Carriage,* a bold satire on serfdom. Even better as dramatic satire is the famous comedy *Chicane* (1798) by Vasili Y. Kapnist (1757–1823). This play is a vicious attack on officers of the law, who are painted as thieves and extortioners. Worthy of mention also are the comedies and comic operas, particularly *The Miller Wizard, Quack and Matchmaker* (1799), of Alexander A. Ablesimov (1742–1783).

The greatest dramatist of the 18th century was Denis Fonvizin (1744–1792). His reputation rests upon two comedies, *The Brigadier-General* (1766) and *The Minor* (1782), which have won him a place among the foremost Russian playwrights. Both are in prose and reflect the influence of neoclassical French comedy, although Fonvizin's immediate model was the Danish dramatist Ludwig Holberg (q.v.), whom he had read in German. *The Brigadier-General* is a social satire directed against the fashionable French semieducation so prevalent in Russia at the time. It is well constructed and full of carefree amusement. Fonvizin's masterpiece, *The Minor,* is more serious, though less well constructed. This too is a social satire, and in the typical neoclassical fashion contains a conventional and uninteresting subplot. Attention is centered on the main plot and the vicious members of the Prostakov family: the domineering bully of a mother, her sheepish husband Prostakov (Mr. Simpleton), her furious brother Skotinin (Mr. Brute), and her son Mitrofan, who typifies brutal selfishness. The satire of the comedy is directed against the crude, barbaric natures of uneducated country gentry. Both character drawing and dialogue are superior, and strike a realistic note that was to be heard again in the best comedy of the 19th century.

Drama During the First Half of the 19th Century.—At the turn of the century there was little progress in the development of drama. French neoclassicism gave way to a taste for sentimental plays, but no original work of value was written in this vein. Ivan A. Krylov (1768–1844, q.v.), wrote two rather successful satiric comedies, but the two most popular plays on the Russian stage were translations from the German melodramatist, A. F. F. von Kotzebue (q.v.). The outstanding native dramatist of the early 19th century was Vladislav Ozerov (1770–1816). His sentimental verse tragedies, such as *Fingal* (1805) and *Dmitri of the Don* (1807), owed their tremendous success to superb acting by Catherine Semenova, one of Russia's greatest tragic actresses.

During the first half of the 19th century four famous authors wrote plays; two of them wrote plays of supreme merit. Two of these authors, Alexander S. Pushkin (1799–1837), and Mikhail Y. Lermontov (1814–1841), were primarily poets. The third, Nikolai V. Gogol (1809–1852), was essentially a novelist, and only the fourth, Alexander S. Griboyedov (1795–1829, qq.v.), was solely a dramatist. Pushkin's first and longest play, *Boris Godunov* (1825), was an experiment —an attempt to write a Russian Shakespearean

tragedy as a departure from the prevalent French neoclassical form. It is an historical play on the theme of Czar Boris Godunov, written in blank verse. Despite scenes of real dramatic beauty, and occasional passages of stirring poetry, the play was not one of Pushkin's most mature performances. It has never won a secure place on the Russian stage. Pushkin's so-called "little tragedies" *Mozart and Salieri* (1830), *The Feast During the Plague* (1830), *The Covetous Knight* (1836), and *The Stone Guest* (1836), are more interesting and on a much higher level of perfection. They were not intended for acting, but were rather essays in the understanding of character and of dramatic situations: as such they leave little to be desired, either as poetry or drama. Mikhail Y. Lermontov (1814–1841, q.v.) had less merit than Pushkin as a dramatist. As a mere youth he wrote three prose plays that deal with high-strung passions and melodramatic situations. His verse play, *The Masquerade* (1835), has more worth, but it is too melodramatic and the characters barely come alive. The play was revived with some success in Soviet Russia.

There are critics who insist that Nikolai V. Gogol's (1809–1852, q.v.) *Revizor* or *The Inspector-General* (1836) is the greatest play in the Russian language. Certainly it is one of the greatest. The general theme, supplied to Gogol by Pushkin, of the hero who is mistaken by the people of a town for a government inspector, is developed with unerring art from beginning to end. As a piece of theater, it is perfectly constructed. Gogol's originality, against the background of contemporary drama, is shown by the complete absence of the traditional love element and of any sympathetic characters. The play is a moral satire directed against corrupt and despotic officials. The characters are superbly drawn, and the dialogue with its comic intensity is the most effective, with perhaps one exception, in the whole range of Russian drama. The lasting popularity of this play rests in part on an underlying symbolism which makes the speech and actions of its characters timeless despite their local application. Less known but almost as great is Gogol's comedy *Marriage* (1842), which has more exuberance and pure fun in it than the *Revizor*.

The reputation of Alexander Griboyedov as one of the greatest Russian dramatists rests on one play, *Woe from Wit*, which he wrote in Tiflis in 1822–1823. The play belongs to the French neoclassical school of comedy and recalls at once the manner of Molière. Like Fonvizin, who wrote in the same vein, Griboyedov stresses characters and dialogue at the expense of plot, which is loosely constructed. But in characterization and dialogue in comedy, only Fonvizin and Gogol can be compared to him. The dialogue is unique in Russian drama. It is in rhymed iambic verse of variable length, but the author never allows a rebellious metrical form to spoil the effect of everyday conversation. The dialogue is full of brilliant wit, epigrams, and repartees, and it has provided more clever quotable lines than any other single work in Russian literature. Its characters, such as Famusov, Molchalin, Repetilov, and the famous hero Chatski, have become household words for the universal human traits that they represent.

Drama During the Second Half of the 19th Century.—The remarkable realistic development in fiction during the second half of the 19th century was accompanied by a similar realistic movement in acting and in playwriting. The famous actor Mikhail Shchepkin (1787–1863) had already established the great tradition of Russian realistic acting, which was eventually developed into a theory of theatrical art by the celebrated actor and producer K. S. Stanislavski (1863–1938), in his great Moscow Art Theater, founded in 1898. In its later development Russian scenic realism concentrated on social realism, on truth to the particular, on the least universal and most individual aspects of a given social milieu. All this found its first complete expression in original drama in the plays of Alexander N. Ostrovski (1823–1886, q.v.), the greatest professional Russian dramatist.

Between 1847 and 1886 Ostrovski wrote about forty plays in prose and eight in blank verse. Although of unequal merit, this collection is the most remarkable body of dramatic work in Russian. Dramatists like Griboyedov and Gogol may surpass him in literary genius, but Ostrovski created a school of Russian drama. With few exceptions, his plays are neither tragedies nor comedies; they are best described as "tragicomedies." Though not a master of language, his dialogue is always adequate. Nor is he much of a psychologist, yet his characters have the individuality and uniqueness that we recognize in our fellow creatures. Where he is supreme is in the breadth, the grasp, and variety of his vision of Russian life and in his ability to recreate this life on the stage.

The subject matter of his early and most characteristic plays is the life of Moscow and provincial merchants, and the lower strata of the official world. Ostrovski's first play, *The Bankrupt* (1849), was a sensational success, and it revealed at once his peculiar and rather original technique. He presented only unsympathetic characters, and he boldly discarded the ancient tradition of comedy—the poetic justice that punishes vice. His realism avoids both caricature and farce; it is based on solid first-hand knowledge of the life described. He resorted to no theatrical tricks in order to achieve effects. All these traits were strengthened in the successful plays that soon follow: *The Poor Bride* (1852), *Poverty Is No Crime* (1854), and *The Profitable Post* (1857). The play generally considered his masterpiece is *The Storm* (1860). It is the most poetic piece he ever wrote, a great poem of love and death, of freedom and thraldom. The inevitable tragedy of the heroine grows out of the dark, oppressive forces of Russian provincial life at that time. Notable later plays are *Enough Simplicity in Every Wise Man* (1868), *The Forest* (1871), and *Wolves and Sheep* (1877).

The only two contemporary dramatists who approach Ostrovski's art are Alexander V. Sukhovo-Kobylin (1817–1903) and Aleksei F. Pisemski (1820–1881, q.v.). The best of the former's three plays is *Krechinsky's Wedding* (1855), a pure comedy of picaresque intrigue, in which the rogue triumphs over the stupidity of the virtuous character. The two chief rogues, Krechinsky and Rasplyuyev, are among the most memorable in Russian dramatic literature, and the play has a secure place in Russian repertoire. The two other comedies, *The Affair* (1869) and *The Death of Tarelkin* (1869), are brutally cynical satires. Pisemski, essentially a

novelist, began his dramatic career with comedies. But his most memorable work is one of the great tragedies in Russian dramatic literature, *A Hard Lot* (1860). The subject concerns the seduction by a squire of the wife of one of his serfs; the husband murders his wife and gives himself up to the law. The human conflict between the squire, who is legal master of the husband, and the husband, who is legal master of his wife, is worked out powerfully with a tragic inevitability that is classical in quality.

The great realistic novelist, Ivan S. Turgenev (1818–1883), ranks perhaps next to Pisemski as a playwright, though some critics give this position to Leo Tolstoy for his dramatic works. Early in his career, Turgenev thought he might devote himself entirely to drama. His plays belong to the years 1843–1852. They are largely experimental gropings after an adequate form of expression. The most actable is *The Provincial Lady* (1851), a light comedy with delicate characterizations. *A Month in the Country,* a more interesting play, is a psychological study on the old theme of rivalry in love between a mature woman and a young girl. In its undramatic nature it is a forerunner of Anton P. Chekhov's plays.

In the extensive literary production of Leo (Lev) Tolstoy (1828–1910, q.v.), drama was merely incidental. Yet he wrote several plays, one or two of which have an enduring place in the great dramatic literature of Russia. He succeeded though he possessed few of the essential qualities that make a dramatist. On the lighter side are *The Contaminated Family* (1863), a delightful satire on the young generation and a little masterpiece of character drawing and dialogue; the *First Distiller* (1886), a humorous antiliquor morality play; and *The Fruits of Culture* (1889), an amusing social comedy which satirizes the vogue of spiritualism. But the best known and greatest of his plays is *The Power of Darkness* (1887), a realistic tragedy of peasant life. The play embodies a favorite conviction of Tolstoy, the evil-begetting power of every evil action. Although superfluous details clutter up the action, there are great moments in the play, particularly the impressive third act where we see Nikita enjoying the first joyless fruits of his initial crime. Two more plays of Tolstoy are worthy of comment: *The Light That Shines in Darkness* (begun early in the 1880's and continued in 1900–1902 but never finished), and *The Living Corpse* (1900). The first draws on Tolstoy's life, for it concerns a Tolstoyan moralist surrounded by an unsympathetic family. *The Living Corpse,* in point of view, is rather unique for Tolstoy; it reflects the mellow attitude of a kindly old man, free from Tolstoy's customary dogmatic moralizing, and full of sympathy for the abandoned drunkard in the play and even for the proud society mother. The dialogue in both these plays is remarkably true to the society speech of the time.

The second half of the 19th century saw a revival of metrical historical plays, largely under the belated influence of Pushkin's *Boris Godunov.* In general all these plays are characterized by mediocre blank verse and by failure, despite often careful research, to catch the flavor of old Russia, from which most of the themes were drawn. The movement was begun by the poet Leo A. Mei (1822–1862) in his *Maid of Pskov* (1860), a conventionally pretty drama of the time of Ivan the Terrible. Between 1862 and 1868 Ostrovski also tried his hand at a series of chronicle plays; these often dramatize history interestingly, but the verse is flat and the characters are wooden. The best of these historical dramatists is Aleksei K. Tolstoy (1817–1875) whose famous trilogy, *The Death of Ivan the Terrible* (1866), *Czar Fyodor* (1868), and *Czar Boris* (1870), deserves its high reputation. The historical material is skillfully handled, the character drawing is adequate and sometimes brilliant, and the blank verse is superior to that in other contemporary historical plays.

Drama and Theater on the Eve of the Revolution.—The founding of the Moscow Art Theatre in 1898 by Stanislavski and Vladimir Nemirovich-Danchenko ushered in a new development in Russian theater and drama. One of the first productions of the new theater in 1898 was Chekhov's *The Seagull.* Anton Pavlovich Chekhov (1860–1904, q.v.) had written his first play, *Ivanov,* in 1887 and had followed up its success with several one-act comedies. In 1895 he wrote *The Seagull,* which was acted the next year in St. Petersburg. The performance was an utter failure, for neither director nor actors understood the play, and Chekhov vowed to abandon drama. Stanislavski's performance, however, in 1898, was a triumphant success, and Chekhov turned with new energy to writing plays. There soon followed *Uncle Vanya* (1900), *The Three Sisters* (1901), and *The Cherry Orchard* (1904), all of them striking successes. These four plays constitute Chekhov's theater and represent quite a new direction in drama, although their undramatic nature had been partly anticipated by Ostrovski and Turgenev. There is no subject matter in Chekhov's plays, no plot, no action. In certain essentials the plays resemble his short stories. In a sense there is no hero or heroine; all the characters are equal. And the dialogue Chekhov employs is admirably suited to the expression of one of the favorite ideas of his tales—the mutual unintelligibility and strangeness of human beings who make no effort to understand each other. Further, his plays are steeped in emotional symbolism, and the dominant note is one of gloom, depression, and hopelessness. Stanislavski's style of directing suited perfectly the peculiar nature of Chekhov's plays, and undoubtedly accounted for a good deal of their initial success on the stage. The Moscow Art Theatre specialized in naturalistic realism, dispensed with all theatricality, abandoned the "star" system of acting, and concentrated on bringing out the inner biography of each character.

Chekhov's highly original drama quickly inspired imitators, but almost all imitations of Chekhov are bad. One of the first was Leonid Andreyev (1871–1919, q.v.), who wrote about a dozen plays, several of which are still played. His Chekhovian realistic plays of Russian life, such as *Towards the Stars* (1906), *Days of Our Life* (1908), *Anfisa* (1910), and *Gaudeamus* (1911), are very poor Chekhov. He showed more originality, however, in another group of plays, which are symbolical dramas in a conventional setting, such as *The Life of Man* (1907), *King Hunger* (1908), *Black Masks* (1909), *Anathema* (1910), and *He Who Gets Slapped* (1914). *The Life of Man* and *He Who Gets Slapped* won considerable success both in Russia and abroad. There is a curious avoidance of

real life in his plays, and the rhetorical prose and gaudy colors weary both the ear and eye. But their melodramatic effects often make for good theater, and for a time their philosophy of vanity, death, and the falseness of everything human had vogue. There is something of the Chekhovian atmospheric details in the plays of Mikhail P. Artsybashev (1878–1927, q.v.), although he was additionally influenced by Strindberg. His psychological problem dramas, including *Jealousy* and *War,* are rather crude but they act well.

Maxim Gorky (Maksim Gorki) (1868–1936, q.v.), whose dramatic efforts continued well into the period after the 1917 revolution, began as a patent follower of Chekhov. He wrote fifteen plays, but only two or three won outstanding success on the stage. His first play, *The Petty Bourgeois* (1901), was a bitter picture of a middle-class family and a revolutionary engine driver. It was eclipsed by *The Lower Depths* (1902), which won sensational fame in Russia and abroad. This play is a penetrating study of different types of human derelicts in an underground night's lodging. Gorky's dramatic system resembles Chekhov's. The four acts, undivided into scenes, the absence of action, and the exaggerated development of conversations on the meaning of life—all these suggest Chekhov. The conversations particularly, but also the extraordinary realism of the settings and the unique characters, won unbounded applause for *The Lower Depths,* especially abroad. Succeeding plays: *Suburbans,* (1904), *Children of the Sun,* (1905), *The Barbarians,* (1906), *Enemies,* (1907), *Vassa Zheleznova,* (1911) won no great success. However, *Yegor Bulychev and Others* (1932) was extremely well received in Soviet Russia. Its theme is the death of a capitalist on the eve of the revolution.

Soviet Russian Drama and Theater.—Theatrical development in Soviet Russia has continued and even surpassed the finest traditions of the prerevolutionary period; the Russian theater today is perhaps the most vital in the world. Recognizing the educational and cultural value of the theater, the Soviet government gave every encouragement to the theater arts, and millions of people who had never witnessed a play before became constant theatergoers. There has been a great expansion and development of theatrical schools, theories of acting and staging, and other phases of the theater. The Moscow Art Theatre took a new lease on life after 1917, and other now famous theaters developed individual theories of dramatic art—the Meyerhold Theatre, the Vakhtangov Theatre, the Kamerny Theatre, and the Realistic Theatre.

Playwriting has hardly kept pace with the art of the theater, yet the Soviet plays written since 1917 are not markedly inferior in quantity or quality to those of any other nation in western Europe or America during the same period. Soviet drama, like fiction or poetry, has mirrored the swift political, social, and economic changes in the Union of Soviet Socialist Republics. Most of the dramatists first on the scene, such as Aleksei N. Tolstoy (1882?–1945), K. A. Trenev (1878–), Anatol V. Lunacharski (1875–1933), B. S. Romashev (1895–), and Sergei M. Tretyakov (1892–), belonged to the intelligentsia, and some had written plays before the revolution. Several novelists who also wrote plays belong to this group and some have gained a permanent place in the Soviet theater. Varied tendencies, futuristic, romantic and realistic, feature the plays of the early Soviet period.

A second group of dramatists, some of proletarian origin, wrote plays mainly on civil war themes. These were frequently poorly executed propaganda plays. Among them are *The Echo* (1924) and *The Storm* (1926) by V. N. Bill-Belotserkovski, (1884–), and *The Band* (1924) by F. V. Gladkov.

Playwrights with postrevolutionary training make up the third group; a few of them have written plays of enduring worth. Of particular significance are Alexander N. Afinogenov (1904–1941), Vladimir M. Kirshon (1902–), Nikolai F. Pogodin (1900–), and V. V. Vishnevski. Some of their outstanding plays are Afinogenov's *Fear* (1931) and *The Town of Dalekoye* (1935); Kirshon's *Bread* (1931); Pogodin's *Tempo* (1930) and *Aristocrats* (1935); and Vishnevski's *First Cavalry Army* (1930).

The tendency in Soviet drama, as in fiction, has been more and more toward realism, and attempts were made to treat the problems and conflicts that grew out of the changing Soviet life. Straight propaganda plays, such as V. V. Mayakovski's *Mystery-Bouffe* (1921) and *The Bedbug* (1929), and Sergei M. Tretyakov's *Roar China!* (1926)—the last a crude drama of foreign imperialism—soon wearied the audiences. A few of the civil war plays, especially the *Armored Train* (1927) of V. V. Ivanov (1895–), Mikhail Bulgakov's (1891–1940) *Days of the Turbins* (1926), and Trenev's *Lyubov Yarovaya* (1926), were well constructed and well acted.

A portion of the great body of literature written during the First Five-Year Plan, was drama. The plays of this period suffered from the monotonous and didactic propaganda patterns enforced by the dictatorial heads of RAPP (Russian Association of Proletarian Writers), who required writers in all literary forms to contribute their skill to the tremendous drive for industrial reconstruction and agricultural collectivization. A few of these forthright propaganda dramas, however, were good plays; for example, Afinogenov's *Fear,* which attempts to solve in terms of individual and not mass psychology the moral problem of revolutionary terror. N. F. Pogodin's *Tempo* (1930) and V. M. Kirshon's *Bread* (1931) were also superior to the average Five-Year Plan dramas, despite shortcomings in construction and dialogue.

In more recent Soviet drama the realistic trend has continued. Effective anti-Nazi plays appeared both before and after the Nazis came in to power. Many of the later Soviet plays show deeper understanding of the individual's problems in a collectivist society. The didactic element has not been eliminated, but dramatists are growing more concerned with the causes and effects of universal human behavior. Contemporary dramatic concern with the past of the Russian people is reflected in historical plays, often dramatizations of famous novels, such as Leo Tolstoy's *War and Peace* and Aleksei N. Tolstoy's *Peter I.* This trend continued after the German invasion of 1941; other plays treated immediate war themes with stark realism. Among these were Konstantin Simonov's *The Russian People,* Leonid Leonov's *Invasion,* and

Alexander Korneichuk's *The Front* and *Guerrillas of the Ukrainian Steppes.*

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4. MUSIC. Folk Music.—Russian music is at least one thousand years old. The first folk melodies of European Russia date from the 10th century; Asiatic Russia did not come into the national cultural complex until centuries later. The most ancient Russian folk songs are entirely *sui generis;* for the first great alien influence, from Byzantium, was a factor affecting Russian religious music only. Russian folk song collectors have gathered and published so much authentic musical material during the last century and a half that the record of traditional Russian folk songs is now remarkably complete.

Peter Sokalski (1832–1887), in his book *Russian Folk Music in its Melodic and Rhythmic Structure* (Kharkov 1888) summarizes the essential characteristics of ancient Russian folk songs in these four points: (1) the melodic motion of Russian folk songs is predominantly descending; (2) the range of folk modes varies from as narrow as a fourth to as wide as an octave and a fourth; the older the song, the narrower the range; (3) the intervals of the fourth and fifth determine the modulation to the new keys; (4) in ancient Russian folk music, only three tones are used, a whole tone, and a tone and a half, adding up to the interval of the fourth.

The rhythm of Russian folk songs is determined by characteristic groupings of two short notes followed by a long note—the most familiar example is the *Song of the Volga Boatmen.* As for metrical arrangement of musical phrases, Russian folk songs have a large incidence of uneven metrical units (such as 5, 7, or 11) to a musical phrase. Great Russian composers have used such typical time-signatures as 5/4 (Glinka), 7/4 (Borodin), and 11/4 (Rimski-Korsakov).

The first collection of Russian folk songs, *Collection of Simple Russian Songs With Notes,* was compiled and published (1782) by Vasili Trutovski, a singer at the court of Catherine the Great. A more important collection was made by the Russianized Czech Ivan Prach, of 150 songs noted down for him by Nikolai Lvov, a musical amateur. Its publication in 1790 found immediate response, and a second edition appeared in 1806. The famous Italian composer Giovanni Paisiello (q.v.) expressed amazement at the beauty of these songs created by simple peasants, and Ludwig van Beethoven (q.v.) incorporated themes from them in his String Quartet, Opus 59, which he dedicated to Count Andreas Razumovski, the Russian ambassador to Vienna. More songs were collected and classified during the 19th century. The most significant collection was by N. Palchikov (Moscow 1888); he published 125 melodies with texts, all gathered in the village Nikolayevka, in Ufa Province. Palchikov gives as many as eight versions of each song, enough to permit general deductions as to the chief characteristics of Russian folk music. Harmonizations of Russian folk songs published by Balakirev (1886), Rimski-Korsakov (1877), Tschaikovsky [Chaikovski] (1868); Lyadov (1894) and others, further increased the interest in the subject.

The beginning of scientific musical ethnography was made by Evgenie Lineva, who was first to use the phonograph in recording Russian folk songs. She published, in 1905 and 1912, two volumes of transcriptions of Russian folk songs under the general title *Peasant Songs of Great Russia in Folk Harmonizations Transcribed from Phonograms.* Each song begins with a solo, and is followed by a chorus in which the basic melody is freely embellished. The choruses usually have two or three individual parts, but Lineva found some four-part singing. She believed that Russian folk music is essentially polyphonic, but there is no proof that the ancient songs were anything more than single musical phrases, without secondary parts. The later polyphony of peasant choruses may have been the influence of part singing in the church choirs.

Musical ethnography continued to advance after the 1917 revolution. Numerous collections of regional songs have been published under the auspices of the Academy of Sciences, in the folklore series of the institute of anthropology, ethnography, and archeology. For example, two substantial volumes of songs from the relatively small region of the Pinega River basin were published in 1937. Revolutionary songs of czarist times are included in the collection *Russ-*

kaya Narodnaya Pesnya (*Russian Folk Song*), published in Moscow in 1936.

Instruments.—Folk music is deeply rooted in Russian folklore. In *The Tale of the Campaign of Igor* dated about 1200, the legendary figure Bayan, is a musician: "Bayan, as he recited the strife of bygone times, sent out ten falcons after a flight of swans, and the one that was first overtaken began her song. But in truth, brethren, not ten falcons did Bayan loose on the swans, but his wise fingers did he lay on living strings, and they by themselves sang the glory of the princes." The stringed instrument that Bayan played was the ancient *gusli,* a sort of zither or horizontal harp, with ten or more strings and a wooden sound chest. The *gusli* is no longer in practical use. Rimski-Korsakov introduced a part for *gusli* in his opera *Sadko,* to evoke the atmosphere of old Russia, but the part is usually performed on the harp. Other ancient stringed instruments are the *domra* (similar to the guitar, and played with a plectrum), and the *gudok* (a three-stringed instrument with a pear-shaped body, and played with a string bow). The *domras* were revived in Soviet Russia, and are often included in modern orchestral compositions.

In the Ukraine, the *domra* is known under the name *kobza* or *bandura* (from the Polish *pandura*). The popular balalaika is in all probability a development of the *domra.* In the 18th century, the balalaika assumed its familiar triangular shape. It usually has three strings and is plucked like a guitar, without a plectrum. An ensemble of balalaikas, organized by V. Andreyev early in this century, gave many successful concerts in Russia and abroad.

Among Russian wind instruments, the following are typical: the *rog* (diminutive, *rozhok*), a hunting horn; the *dudka,* a vertical flute; the *zhaleika,* a double reed with a single mouthpiece—the two pipes are connected at an angle; and the *svirel,* a panpipe composed of several reeds of different lengths, bound together. The nomenclature of these instruments varies according to locality and period. Finally, there is the Russian bagpipe or *volynka,* probably so named because of its supposed origin in the district of Volynia. It consists of a goatskin bag and two pipes. The *volynka* is referred to in the proverbial phrase, *zatyanut volynku,* "to strike up the bagpipe," meaning to begin a tedious tale.

A most remarkable development of Russian primitive instruments was an orchestra of hunting horns (*rog*), initiated by Simeon Narishkin in 1751. Forty-nine hunting horns of different sizes were manufactured, ranging from three inches to the enormous length of 24 feet. The largest horn produced the note of low A under the bass clef staff. Each member of the ensemble could play only one note, and patient rehearsing was required to perform even a simple polyphonic composition. A German resident of St. Petersburg, Jacob von Stählin (1709–1785), described hearing a successful performance in his interesting memoire, *Nachrichten von der Musik in Russland* (1770); his account was republished, in Russian translation in *Musikalnoye Nasledstvo* (*Musical Heritage,* Moscow 1935).

Ancient Russian percussion instruments were drums, metal bars, and bells. The most interesting instrument is the *buben* (tambourine). A huge *buben,* called *nabat,* was so large that it took four horses to carry it and eight men to operate it.

Skomorokhi.—The first musical entertainers mentioned in Russian history were the *Skomorokhi,* or minstrels, who are spoken of as early as 1068, in Nestor's chronicle. Nestor (1056–1114), Russian monk and chronicler, complained that entertainments by the *Skomorokhi* drew the people away from God; that churches stood empty while the populace amused themselves by playing on the *gusli* and blowing trumpets. According to 13th century sources, the *Skomorokhi* played panpipes (*svirel*), string instruments (*gudok*), and the tambourine (*buben*). In the 15th century, they introduced a new type of entertainment, the puppet theater, which ultimately developed into the popular carnival play *Petrushka.*

The *Skomorokhi* were so popular in medieval Russia that numerous villages in Central Russia were named Skomorokhovo. As this popularity spread, the opposition of church and lay authorities grew stronger. Czar Aleksei (1645–1676) took drastic measures against the *Skomorokhi.* In his decree of 1649, he ordered ruthless persecution of the "godless *Skomorokhi* with their *domras* and *gusli,*" and instructed police to destroy all musical instruments found among their possessions.

Very little is left of the musical compositions sung by the *Skomorokhi;* Nikolai F. Findeisen, in his valuable two-volume work, *Sketches of Music History in Russia from the Most Ancient Times to the End of the Eighteenth Century* (Moscow 1928), cites a few songs and verses preserved in oral tradition.

Church Music.—Parallel to the development of folk music, the church established the foundations of formal musical learning. The pioneers were Greek and Bulgarian clerics who introduced Byzantine chant into Kiev after the Christianization of Russia. As early as the 11th century, texts with musical notation, derived from the Byzantine system of neumes, were in use in the Kiev churches and monasteries. In the 13th century, the Russian system of notation, known as *znamenny* (from *znamya,* sign) or *kryuki* ("hooks," from the angular shape of the notes), emerged as a native version of the Greek system. In 1551, Ivan the Terrible (1530–1584, q.v.) established schools for teaching musical notation for use of church choirs. He had some knowledge of music and wrote several religious chants himself. Later still, the eight modes of the Russian *znamenny* chant were organized according to typical melodic figures, called *popiyevki* (singing patterns). About 1700, the five-line notation, current in Europe, was universally adopted in Russian churches.

The first beginnings of polyphonic choral music date from the early 18th century. In 1713, Peter the Great (1672–1725, q.v.) formed a choir of sixty singers, and Russian noblemen organized private choruses. These so-called *capellas* (from the Italian word *cappella,* meaning chapel or choir) developed into the Russian choirs which became famous for their fine qualities and virtuosity. The *capella* founded by Peter the Great is still flourishing in Leningrad.

The father of Russian religious music in the polyphonic style was Dmitri Bortnyanski (1751–1825), who studied in Italy, where he acquired the technique of part writing. Maxim Berezovski (1745–1777) wrote during his short life (he

committed suicide at the age of 31) many sacred works of high quality. Aleksei Lvov (1799–1870), author of the czarist national anthem, also composed sacred music, and wrote a treatise on the structure of Russian religious songs. Later both Peter Tschaikovsky (Chaikovski) and Alexander Grechaninov, (qq.v.) contributed to Russian music, writing in a free contrapuntal style.

Secular Music.—The initial impetus to secular music was given by the Italian musicians who were invited to Russia in the 18th century by the empresses Anna Ivanovna, Elizabeth Petrovna, and Catherine the Great (qq.v.). They included several world renowned names: Francesco Araja, Vincenzo Manfredini, Giuseppe Sarti, Baldassare Galuppi (q.v.), Tommaso Traetta, Giovanni Paisiello (q.v.), Domenico Cimarosa (q.v.), and others. These Italians were largely responsible for the flourishing state of opera and ballet in St. Petersburg during the second half of the 18th century. They acted as choir masters, teachers, concert players, and composers. The first opera with a Russian text, *Cephalus and Procris,* was composed by Francesco Araja (c.1700–c.1770) on a libretto by Alexander Sumarokov (1718–1777), and produced in St. Petersburg in 1755. Its serious defect is inaccurate conformity with the prosody of the libretto; Araja had poor knowledge of the Russian language.

Under the influence of Italian music, several Russian-born composers wrote operas during the reign of Catherine the Great. Among them were Evstigney Fomin (1761–1800), the author of the opera *Amerikantsy* (in the sense of Indians), depicting a romantic story in Mexico; and Vasili Pashkevich, composer of the opera *Fevey,* of which Catherine the Great wrote the libretto. The *Kalmuck Chorus* from the opera *Fevey* is the earliest example of orientalism in Russian music.

The National School.—By the beginning of the 19th century, Russian music had evolved to a point where it was feasible to establish a national style of composition. The Russian art song, in the folklore manner, was cultivated by Alexander Alyabyev (1787–1851), Nikolai Titov (1800–1875), and Alexander Varlamov (1801–1848). Aleksei Verstovsky (1799–1862) wrote an opera on a Russian subject, (*Askold's Tomb,* 1835), which in spite of its Italianate idiom has some Russian traits.

The acknowledged founder of the Russian national school of composition was Mikhail I. Glinka (1804–1857, q.v.), who is to Russian music what Alexander Pushkin (q.v.) is to Russian literature. Glinka integrated the elements of Russian musical folklore into a musical language that can be called genuinely national. His first opera was produced in 1836, under the title *A Life for the Czar;* he had originally named it *Ivan Sussanin.* The subject was taken from Russian history, and Glinka developed it in a purely national manner, especially in the songs and choral passages. His second opera *Ruslan and Lyudmila* (1842), from Pushkin's poem, is remarkable for its brilliant color. Glinka's symphonic dance, *Kamarinskaya,* was the earliest example of orchestral treatment of Russian dance rhythms. In his songs and ballads, the vocal line of Russian songs received its perfect expression.

The music of Alexander S. Dargomyzhski (1813–1869) differs greatly from Glinka's. Less brilliant in color, it is rich in musical characterization. Dargomyzhski's opera *Russalka* (*The Mermaid,* 1855) retains the traditional division into arias, but is written in a distinctly Russian folklore style. In his posthumous opera *Kamennyi Gost* (*The Stone Guest,* 1868), Dargomyzhski appears as an innovator: he abandons Italian models in favor of operatic realism, and replaces conventional recitative with vocal declamation.

The Mighty Five.—Both Glinka and Dargomyzhski remained little known outside Russia, but with the great symphonic and operatic works of Tschaikovsky, Rimski-Korsakov, and Musorgski Russia became a powerful factor in the general course of music history. The spirit of nationalism in Russian music was accentuated when five Russian composers known as the *Moguchaya Kuchka* (literally, "a mighty heap") formulated a set of musical aims. These composers were Balakirev, Borodin, Cui, Musorgski, and Rimski-Korsakov, and the epithet was bestowed on them by the Russian critic Vladimir Stasov (1824–1906). The individual talents and the contributions to Russian national music by these five composers were far from equal. César A. Cui (1835–1918), a military engineer who wrote several operas in a conventional romantic style, could not be included among the "Mighty Five" except by accident. Mili A. Balakirev (1837–1910) played the role of spiritual head of the group and did much to inspire his companions with the ideals of Russian national art. But he wrote little, and only his Oriental fantasia, *Islamey,* survives the test of time. It is more appropriate, therefore, to speak of the "Mighty Three" of Russian music: Borodin, Rimski-Korsakov, and Musorgski. It is interesting that not one of them was a professional in the narrow sense of the word. Borodin was a professor of chemistry, Rimski-Korsakov was a naval officer, and Musorgski was a government employee.

Of the three, Nikolai Rimski-Korsakov (1844–1908) was the most prolific. In his many operas, he re-created the spirit of Russian folklore and history. Russian legends and folk tales are reflected in *Snegurochka* (*Snow Maiden,* 1882) and *Sadko* (1894); and Russian history in *Tsarskaya Nevesta* (*Czar's Bride,* 1893). He wrote operas to two fairy tales by Pushkin, *Czar Saltan* (1899–1900) and *Zolotoi Petushok* (*Le Coq d'or,* or *The Golden Cockerel,* 1906). Rimski-Korsakov's religious opera *Skazanye o Nevidimom Grade Kitezhe* (*Tale of the Invisible City of Kitezh,* 1907) shows the influence of Wagner's *Parsifal.* In the symphonic field, *Scheherazade* (1881) was epoch-making in its colorful treatment of musical material.

Alexander P. Borodin (1833–1887) was partly an Orientalist. His symphonic sketch *In the Steppes of Central Asia* (1880) utilized elements of Russian orientalism, which appears also in the famous *Polovtzian Dances* from the opera *Prince Igor,* completed posthumously by Rimski-Korsakov and Glazunov. In a purely Russian style, Borodin created an epical work in his Second Symphony (1870), which without an explicit program, paints a panorama of Russian *byliny* (epical chronicles).

Modest Musorgski (Moussorgsky, Mussorgsky, 1839–1881 q.v.) was regarded by contemporaries as an erratic genius with inadequate technical equipment for the tasks he undertook.

In historical perspective, however, he seems the greatest of the "Mighty Five" in boldness of musical invention, and in profound understanding of the essence of Russian national folklore. Many of his harmonic procedures anticipate developments of modern music. Musorgski's greatest work is the opera *Boris Godunov* (1869). It is usually performed in the version prepared by Rimski-Korsakov, in which certain crudities of orchestration and unconventional harmonic progressions are smoothed out. Recently Musorgski's original score was restored, and the opera has been performed as composed, in Russia and abroad. Dmitri Shostakovich also undertook reorchestration of *Boris Godunov* in 1941. Musorgski's opera *Khovanshchina* (on a historic subject) was begun in 1873, and completed by Rimski-Korsakov. In his short opera *Marriage* (1868, after Gogol's play), Musorgski applies the modern treatment of operatic dialogue. His piano suite, *Pictures at an Exhibition* (1874) is remarkable for variety of characterization, from light humor to grandiose tonal painting. The suite has become extremely popular in the orchestration by the French composer, Maurice Ravel.

The cause of nationalism in Russian operatic music was ably served by Alexander Serov (1820–1871), author of *Vrazhya Sila* (*Enemy Power*), produced posthumously in 1871 and still in the Russian theatrical repertoire. Serov's music, however, lacks the revolutionary originality of Musorgski and the effectiveness of Rimski-Korsakov's operatic panoramas. Similarly lacking in force are the numerous operas of Anton Rubinstein (1829–1894), who left a mark on Russian musical culture as the first great Russian pianist and as founder of the St. Petersburg Conservatory (1862). His opera *The Demon* (1875, after Mikhail Y. Lermontov, q.v.) and his effective piano pieces enjoy great popularity. Anton's brother, Nikolai Rubinstein (1835–1881) was also a celebrated pianist and founded the Moscow Conservatory in 1866.

Russian Romanticism.—The unique and solitary figure of Peter Ilich Tschaikovsky, or Chaikovski (1840–1893, q.v.) dominates Russian symphonic music of the second half of the 19th century. Tschaikovsky stood aloof from his musical contemporaries and developed a style intensely individual, subjective, and often morbidly introspective. Although his music is unmistakably Russian, Tschaikovsky rarely resorts to literal quotations of Russian folk songs (as in the finale of the Fourth Symphony). His nationalism lies in his extraordinary power to create a peculiarly Russian mood by expressing his own inner sentiments. From Tchaikovsky's pessimism, his predilection for minor keys, and his choice of titles (*Chanson Triste, Sérénade mélancolique*, etc.) some interpreters of Russian music have concluded that the "Slavic soul" is inexpressibly sad. This conclusion appears unwarranted. Much of Tschaikovsky's own music is joyful, though the programmatic designs of his symphonies are invariably dark and somber. The Fourth and the Fifth symphonies express the inexorability of fate and the futility of struggle. The spirit of the Sixth Symphony (*Pathétique*, 1893) which Tschaikovsky conducted in St. Petersburg a few days before his death from cholera, is one of dejection. The musical quotation from the service for the dead, in the first movement of the *Pathétique* is characteristic of the composer. Tschaikovsky's symphonic poems (*Romeo and Juliet*, 1869; *Francesca da Rimini*, 1876) are romantically somber, but the music itself has great vitality. Tschaikovsky's operas, *Eugene Onegin* (1878) and *La Pique-Dame* (*The Queen of Spades*, 1890), both after Pushkin, are extremely popular in Russia, as are his ballets, *Lac des Cygnes* (*Swan Lake*, 1876), *La Belle au bois dormant* (*The Sleeping Beauty*, 1889), and *Casse-Noisette* (*The Nutcracker*, 1892).

St. Petersburg and Moscow Schools.—Tschaikovsky and the "Mighty Five" greatly influenced the development of Russian music during the late 19th and early 20th centuries. Tschaikovsky's followers cultivated the romantic type of symphonic, operatic, and vocal music. The center for musical nationalists of the modern school was St. Petersburg, where the "Mighty Five" had flourished, while the stronghold of the romantic school was Moscow, where Tschaikovsky had taught at the conservatory.

The heir of the nationalist School of St. Petersburg was Alexander Glazunov (1865–1936); he wrote eight symphonies, violin and piano concertos, and chamber music, but no operas. As director of the St. Petersburg Conservatory (1906–1927), Glazunov played an important role in the education of the new generation of Russian composers. Anatole Liadov, or Lyadov (1855–1914), not a prolific composer, distinguished himself principally by short symphonic poems (*Baba-Yaga, Kikimora*) in the Russian folklore manner. Nikolai Tcherepnin, or Cherepnin (1873–1945) is known chiefly for his songs in Russian style.

The greatest representative of the Moscow school was Sergei Rachmaninov (1873–1943, q.v.); his most enduring works are his piano compositions, which greatly elevated Russian pianistic style. His Piano Concerto in C Minor, No. 2 (1901) is a classic of piano literature. His songs, poetic and lyrical, are in the Tschaikovsky tradition. Rachmaninov spent the last 25 years of his life abroad, chiefly in the United States, and his work of this period is less significant than his earlier music. Anton Arenski (1861–1906, q.v.), wrote effective piano and chamber music in a style resembling Rachmaninov's, and Vasili S. Kalinnikov (1866–1901) is remembered for his romantic First Symphony.

Sergei I. Taneyev (1856–1915), Nikolai Medtner (1880–), Alexander Grechaninov (1864–), Mikhail M. Ippolitov-Ivanov (1859–1935), Reinhold Glière (1875–), and Sergei Vassilenko (1872–) in general follow the Moscow school, with some stylistic departures toward the nationalists. Taneyev was a great master of counterpoint and wrote a monumental treatise on contrapuntal technique. Few of his compositions (a symphony, chamber music, songs) achieved popularity. Medtner wrote almost exclusively for piano, and his style is a modern adaptation of Chopin and Brahms. After the revolution, Medtner left Russia in 1921 and settled in London in 1936. Grechaninov composed several operas, which follow the nationalist school in using subject matter from Russian epical legends. His songs and choral works reflect Russian romanticism. Grechaninov left Russia in 1925 and settled in the United States in 1939, where he continued to compose. Glière combines features of the nationalist school with romantic elements. Vassilenko adheres stylisti-

cally to the Moscow school, with some kinship to the nationalists in his operas.

Vladimir I. Rebikov (1866–1920) merits a place in the history of Russian music. At first a follower of Tschaikovsky, he was later attracted to modernism. He was the first Russian composer to use the whole-tone scale, not as an incidental device, but as a basic thematic structure.

Russian Modern Music.—The first true modernist of Russia was Alexander Scriabin or Scriabine (1872–1915, q.v.). His early piano works were strongly influenced by Chopin and his orchestral music owed much to Wagner. But Scriabin outgrew these influences to develop his own highly individual technique of composition. He moved from the harmonies of Liszt and Wagner to a style of composition in which tonality almost ceases to exist and dissonances supplant concords. As a new harmonic basis Scriabin made use of a six-note chord, which he called the "mystic chord." Religion and philosophy were important in Scriabin's aesthetics, and his major works bear such indicative titles as *Le Divin Poème* (*The Divine Poem,* 1903); *Le Poème de l'Extase* (*The Poem of Ecstasy,* 1907–1908); and *Le Poème du Feu* (*The Poem of Fire,* 1909–1910). In *Poem of Fire* (also known as *Prometheus*), Scriabin included a part for a *clavier à lumières,* an instrument designed to produce sequences of colored lights. This color keyboard proved impractical, however. Shortly before his death, Scriabin made sketches for a pantheistic work called *Mystery,* in which he intended to unite all arts. Scriabin's music stands outside Russian national culture as a purely musical development of modern times, yet his technical innovations and his explorations in the field of new sonorities have deeply influenced the new generation of Russian composers.

The modern period of Russian national music is associated with the name of Igor Stravinski (1882– , q.v.). Stravinski's early works continued the tradition established by Rimski-Korsakov, with whom Stravinski had studied. The use of color in instrumental treatment and the programmatic depiction of Russian fairy tales, characteristic of Rimski-Korsakov's last period, are the mainstays also of Stravinski's early compositions. His *L'Oiseau de Feu* (*The Firebird,* 1910) is a colorful symphonic panorama of Russian folklore. His *Petrushka* (1911) portrays the scenes of the Russian carnival. Both scores were written for Sergei Diaghilev's Ballet Russe in Paris. After their production, Stravinski went abroad; he became a French citizen in 1934, and lived in France until 1939, when he went to the United States. Paradoxically, Stravinski became the acknowledged leader of Western modernism through works which are intensely Russian. His most revolutionary score is *Le Sacre du Printemps* (*The Rites of Spring,* 1913), which is a modernistic representation of the rituals of pagan Russia. In this composition, Stravinski broke away from tradition and introduced polytonal and polyrhythmic innovations of unprecedented boldness. After 1924, Stravinski's style changed toward neoclassicism. His works of this period are based on pseudo-classical formulas (the ballet, *Apollo Musagètes,* 1927; the opera-oratorio, *Oedipus Rex,* to a Latin text, 1928; *Symphonie des Psaumes,* 1930), or are pasticcios of music by other composers (*Le Baiser de la Fée,* [*The Kiss of the Fairy,* 1928], a ballet based on Tschaikovsky's themes).

Several Russian composers living abroad were commissioned to write ballets for Diaghilev's Ballet Russe. The most prominent is Sergei S. Prokofiev (1891–). He returned to Russia in 1933, after an absence of 16 years, and identified himself with Soviet music. Of the younger men, Vladimir Dukelski (1903–), Nikolai Nabokov (1903–) and Igor Markevich (1912–) wrote effective ballets in the neoclassical manner, which were produced by Diaghilev.

Soviet Music.—The period after 1917 provides the musical historian with many contrasts. The political revolution did not signalize developments of extreme leftism in music. Ultramodernists attempted to discard the musical heritage of the past and to inaugurate a new revolutionary type of music, but such attempts were doomed to failure from popular distaste. Adherents of proletarian music were equally unsuccessful in attempting to emphasize mass appeal and revolutionary subject matter. A compromise was effected in the formula of socialist realism, which postulates an art "socialist in content and national in form." Changing trends in Soviet musical aesthetics ran parallel with changes in the political and social structure of the Soviet Union. The development of Soviet music may be subdivided into three phases: (1) the initial period, from 1917 to 1921, marked by the spirit of absolute innovation; (2) the period of conflicting trends, from 1921 to 1932, signalized by the rise and fall of proletarian music; (3) the period of socialist realism in music, after 1932.

The atmosphere of famine and civil war during the early years of the Soviet regime did not encourage creative composition. Yet concert life continued, and the new audiences of soldiers and workers eagerly patronized the opera, ballet, and symphony. Revolutionary ideology had little effect on the repertoire, although there were attempts to inject a social note into familiar operas. Giacomo Puccini's *Tosca* was rewritten as a story of the Paris Commune and Giacomo Meyerbeer's *The Huguenots* was changed to *The Decembrists;* but after a few performances, the old libretti were restored.

The first operas on Soviet subjects were *Za Krasni Petrograd* (*For Red Petrograd,* 1926) by Arseni Gladkovski (1893–) and Vladimir Prussak, and *Ice and Steel* by Vladimir Deshevov (1889–). The libretto of the first treated the Petrograd campaign of 1919, and the second opera was about the Kronstadt rebellion of 1921. Neither was successful. More interesting was *Severny Veter* (*The North Wind,* 1930) by Leo Knipper, an opera on the subject of the civil war and intervention. The first really successful Soviet operatic composer was Ivan Dzerzhinski (1909–). The subject of his first opera was Mikhail Sholokhov's famous novel *Tikhi Don* (*And Quiet Flows the Don*). It was produced in Leningrad on October 22, 1933, and had instantaneous success. His second opera, *Podnyataya Tselina* (*Soil Uprooted*), also after Sholokhov, was staged in Moscow on October 23, 1937, and proved equally successful. Other Soviet operatic composers of significance are Oles Tchishko (1895–), author of the opera *Battleship Potemkin* (1937) and Tikhon Khrennikov (1913–) who wrote the opera *Brothers* (1936) based on an episode from the civil war.

The Ukrainian composer Boris Lyatoshinski (1895–) composed an opera *Shchors,* on the life of a Ukrainian civil war hero of that name.

Though the early years of the revolution saw few radical departures in composition itself, there were many daring innovations in musical science and in performance. In Moscow, a conductorless orchestra, called *Persimfans,* for Pervi Simfonicheski Ansamble (First Symphonic Ensemble), was organized in 1922 as a protest against autocratic conductors. For five years it presented numerous classical and modern works. In 1922, the Soviet engineer Leon Theremin (1896–) demonstrated in Moscow the first electronic instrument, the *thereminovox,* capable of unlimited variation of pitch and tone-color. A later development in electronic instruments was the *emiriton,* or electric piano, built in 1943 by a grandson of Rimski-Korsakov.

With the re-establishment of communications with western Europe, Russian musicians became acquainted with the new music of Germany and France. The Association of Contemporary Music in Leningrad, formed in 1927, was active for several seasons in presenting works by European modernists. Machine music, as exemplified by Arthur Honegger's (1892–) symphonic poem, *Pacific 231,* had its adepts in Russia. Vladimir Deshevov wrote *The Rails,* which imitated the noise of a railroad train in motion; Alexander Mosolov (1900–) composed the industrial ballet *Zavod (Factory),* which for realistic effect included a metal sheet in the orchestration. On the theme of Soviet industrial development, Prokofiev wrote a ballet called *Le Pas d'Acier (The Age of Steel,* 1925), which was produced in Paris by the Ballet Russe.

In opposition to the modernists, a powerful movement arose in favor of a special type of proletarian music. The Russian Association of Proletarian Musicians (RAPM) issued a manifesto in 1924, proclaiming the principles of proletarian music. It opposed all "progressive" trends in modern music, and all types of Western urban art, including jazz, in favor of revolutionary themes, in the tradition of Beethoven's Third Symphony (*Eroica*). After several years of propaganda and controversy, which threatened to end creative activity in Russian music, the RAPM was dissolved by governmental decree on April 23, 1932. This date was a landmark in the evolution of Soviet ideology in music.

Proletarian music was discredited and now Stalin's formula of socialist realism ("socialist in content, national in form") was applied to music, within the framework of national art. A new crisis came in January 1936, when the Moscow newspaper *Pravda* in two articles severely criticized the composer Dmitri Shostakovich, first for "leftist deviation" and "naturalism" in his opera *Lady Macbeth of the District of Mtsensk* (1930–1932), and second for "oversimplification" in treatment of a Soviet theme in the ballet *Svetly Ruchey (The Limpid Stream,* 1934). The articles posed the problem of defining socialist realism and of drawing a clear line of demarcation so as to prevent the fallacy of "naturalism" or "oversimplification." The Shostakovich case became a *cause célèbre* in the annals of Soviet music, because of the stature of the composer and his place in Soviet art.

Dmitri Shostakovich was born in Leningrad in 1906, and grew up almost entirely under Soviet life; his talent developed with the evolution of Soviet ideology in general aesthetics. His early works were satirical in character. His opera, *The Nose* (1927–1928), based on a tale by Nikolai Gogol (q.v.), featured such effects as drunken hiccoughs, imitated by harp and violins, and the sound of a razor on the face. The part of the principal character, the Nose, was to be sung by a performer with his nostrils stuffed with cotton wads. There was an octet of eight janitors singing eight different advertisements. The opera was produced as an experimental spectacle in Leningrad, on January 13, 1930.

The ballets of Shostakovich have the same satirical vein. In *The Golden Age* (1929–1930) there is a discordant polka which satirizes the Geneva disarmament conference. There is similar satiric strain in his symphonies. His First Symphony in F Minor, written at the age of nineteen, has become a standard piece of orchestral repertoire in Russia and abroad. The Second in F Minor, called *October Symphony,* written at 21, and Third, *May First,* were less popular. After the rebuke administered by *Pravda,* Shostakovich abandoned programmatic music and returned to pure symphonic composition. His Fourth Symphony remained in manuscript, but his Fifth, played in November 1937, at the festival celebrating the twentieth anniversary of the Soviet Revolution, received tremendous acclaim and Shostakovich regained his place as a foremost Soviet composer. The Sixth Symphony (1939) was less successful, but the Seventh (1941), written during the siege of Leningrad, became world-famous. This work depicts the struggle of the Soviet citizen against the invader, and its triumphant finale foretells the inevitable victory. In 1943 Shostakovich wrote his Eighth Symphony, and in 1945 the Ninth Symphony. The Soviet government twice awarded Shostakovich the Stalin Prize of 100,000 rubles, first for his Piano Quintet (1940) and again for the Seventh Symphony.

In recent years the national element has grown very strong in the works of Soviet composers. Prokofiev, since his return to Russia in 1933, has written many compositions in this vein. Among them are the cantata *Alexander Nevsky* (based on the score of a film of the same name, which glorifies the repulse of the Teutonic Knights by the Russian Prince Alexander in the year 1242) and the opera *War and Peace* (after Tolstoy's novel, 1941–1942), completed during the Second World War. He wrote a symphonic suite entitled *1941,* and the *Ballad of an Unknown Boy* (1943), a cantata about a young guerrilla fighter who died for his country. Yuri Shaporin (1890–) has written two patriotic cantatas: *Na Pole Kulikovom (On the Kulikov Field),* commemorating the Russian victory over the Tatars in the 14th century, and *Skazanye o Bitve za Russkuyu Zemlyu (Chronicle of a Battle for Russian Land),* composed in 1944, on the subject of the war against the Nazis.

Older Soviet composers have successfully adapted themselves to the new themes. The most important of them are Reinhold Glière (1875–), Sergei Vassilenko (1872–), Maximilian Steinberg (1883–), and Mikhail Gnessin (1883–). Glière excels in monumental symphonic and operatic subjects; Vassilenko writes romantic music; Steinberg, a disciple and son-in-law of Rimski-Korsakov, continues the tradition of the

Russian national school; Gnessin writes music based on Hebraic motives.

Nikolai Myaskovski (1881–), the greatest symphonist of modern Russia, occupies a unique position. He has composed 24 symphonies, most of them during the Soviet period. Despite his predilection for somber and individualistic moods, Myaskovski's symphonies are highly regarded by Soviet musicians, and he is the acknowledged dean of Soviet composers.

Aram Khachaturian (1903–), an Armenian composer, wrote symphonies, concertos, and chamber music, notable for sincerity of emotional expression. His wife, Nina Makarova (1908–), became known as one of the most talented women composers in the Soviet Union. Other important names in Soviet music are Boris Asafyev (1884–1949), author of numerous operas and ballets, who wrote music criticism under the name Igor Glebov; Leo Knipper (1898–), author of nine symphonies; Alexander Krein (1883–1951), composer of effective stage music; his brother Gregory Krein (1880–), and Gregory's son, Julian Krein (1913–), who wrote instrumental music in a romantic vein; Vissarion Shebalin (1902–), an able symphonist; Alexander Veprik (1899–), who wrote music inspired by Jewish folklore; Dmitri Kabalevski (1904–), composer of several operas, symphonies, and concertos; Mikhail Starokadomski (1901–), who wrote in a neoclassical manner; Valeri Zhelobinski (1912–), who wrote effective piano music; and Vano Muradelli (1908–), Caucasian-born composer who attracted attention by his strongly individual symphonic writing.

Popular music is encouraged in the Soviet Union. Modern folk ballads, marches, and even the syncopated music classified as "Soviet jazz," are widely sung and played. The most successful composer of light music in the period immediately succeeding the Second World War was Isaak Dunayevski (1900–), who received a Stalin Prize in recognition of his achievement. Soviet "mass songs" have a strong flavor of Russian folk music. Some of them have in fact become folk songs, for example: *Polyushko Pole* (*Meadowland*) by Knipper; *Katyusha* (*Katherine*) by Blanter; and *Provozhanye* (*Farewell*) by Zakharov. A marching song by the band leader A. V. Alexandrov, *Gimn Partii Bolshevikov* (*Hymn of the Bolshevik Party*), was proclaimed by government decree (March 15, 1944) the national anthem of the Soviet Union, in place of the *Internationale.* New words for it were written, stressing the national and patriotic character of the country's credo.

Bibliography.—No comprehensive history of Russian music exists in the English language. *A History of Russian Music* by M. Montague-Nathan (London; New York 1914) is sketchy. Gerald Abraham's book *On Russian Music* (New York 1939) is limited to the discussion of 19th century Russian composers. His book *Eight Soviet Composers* (London; New York; Toronto, 1943), deserves mention. Further, there are biographies, in English, of individual Russian composers, notably Tschaikovsky, Musorgski, Rubinstein, Scriabin, Rachmaninov, and Shostakovich. Rimski-Korsakov's book of memoirs, *My Musical Life,* is available in English. Some information on later composers is found in Sabaneyev's book *Modern Russian Composers* (New York 1927). There are scattered magazine articles on various aspects of Russian music, and accounts of Russian church music and notation are available in recent editions of music dictionaries. Literature on Russian music in the French and German languages is very scant, and the available publications in those languages are mostly out of date. In Russian, the basic work on the history of music is *Otcherki po Istorii Muzyki v Rossii* (*Studies in the History of Russian Music*) by Nikolai F. Findeisen, published in two volumes (Moscow 1929). It gives exhaustive information on old Russian music, ancient instruments, church music, and notation, up to 1800. Nineteenth-century Russian music, the period of the great Russian composers from Glinka to Tschaikovsky, has been covered with great completeness in recent publications. Detailed biographies and musical analyses of the works of Tschaikovsky, Musorgski, Borodin, Rimski-Korsakov, and others have been published, and their correspondence, notebooks, and minutiae of life, have been brought to light in numerous authoritative editions by Soviet musicologists. No history of the Soviet period of Russian music has as yet been attempted, but there are concise dictionaries of Soviet composers, and ample information is found in music periodicals, notably *Sovietskaya Muzyka* (Moscow). Thousands of orchestral scores, operas, chamber music works, piano compositions, and songs by Soviet composers have been published by the State Music Press; they provide rich material for the student of Soviet music. Special publications deal with the progress of music in republics of the Caucasus, Central Asia, and Siberia. G. Orlov's compilation, *Muzikalnaya Literature* (Leningrad 1935) contains a detailed bibliography of Russian music up to 1935. See also Slonimsky, N., "Soviet Music and Musicians" in the *Slavonic Review,* December 1944.

Nicolas Slonimsky,
Author of "Music Since 1900"; Composer and Conductor.

5. ART. Old Russian Art.—A few ancient Russian monuments date from the pre-Christian period, but the information about them is scant and their artistic value is too slight to discuss, outside the field of archaeology. The history of Russian art, therefore, begins with the introduction of Christianity in the 10th century. The Christianization of Russia took a century, just as the process of westernization covered a later century. Byzantine art (q.v.), like the art of western Europe, later, was only gradually accepted and assimilated, and it was modified by various influences, including the historically varying national determinant. It is the latter quality that gives unity and continuity to ten centuries of Russian art.

With Christianity came Byzantine literature, art, philosophy, and social institutions. Kiev soon became one of the most prosperous states in Europe and a leading cultural center. With the missionaries and preachers from Byzantium came Greek artists, who produced numerous mosaics, frescoes, and icons for Kiev, Vladimir, and Novgorod, and who taught their skills to the Russians. The Russians were apt pupils, but almost from the first they added touches of their own to the lessons learned. Ancient Russia carried on a lively intercourse with many other states and regions besides Byzantium; and while the Byzantine heritage in art remained para-

mount until the 18th century, it was modified at various times by the art of the Caucasus, Italy, Persia, India, and western Europe, and by the folk art of Russia itself. The ancient empire began falling apart even before the Mongol invasion early in the 13th century, and many separate cities, including Vladimir, Tver, and Pskov had developed clearly marked styles. The most important style centers, however, were Kiev (11th–13th centuries), Novgorod (14th–15th centuries) and Moscow (16th–17th centuries).

The early Kiev period lasted from the baptism of the Emperor Vladimir I (956?–1015, q.v.) to the Mongol invasion; it left mosaics, a few striking frescoes, and icons in the Cathedral of St. Sophia in Kiev, the Cathedral of Chernigov, the Church of Nereditsa of Novgorod and the Dmitriev Cathedral of Vladimir. Most monuments from this period were destroyed by the Germans in their Second World War invasion. Artistic work of the Kiev period very closely resembled its Byzantine prototypes. Most of it was, in fact, produced by Byzantine masters. The compositions contain few figures simply drawn, and convey an air of solemnity. Favorite subjects were Jesus, the Virgin, the church fathers, the apostles and, by way of rare exception, chariot races and other games at the hippodrome of Constantinople, pictured in St. Sophia at Kiev. Figures are conventionalized, as in all Byzantine art, but some have a strong illusionistic quality. The colors are subdued, almost monochrome. When the Mongol invasion in the 13th century isolated Kiev from Byzantium and destroyed many of its monuments, the artistic hegemony passed to Novgorod, the only center not engulfed by the invasion.

Between the fall of Kiev and the rise of Moscow, Novgorod was the most important community in old Russia. Its artists continued to work in the Byzantine tradition which received an added impetus from the second renaissance of Constantinople. Their greatest achievement, however, lay in the building on the Byzantine foundation of a national art as expressed in the frequent use of national saints, in folk ornamentation, in bits of national genre, and architecture, in greatly enriched colorfulness with the generous employment of red, yellow and green so characteristic of Russian folk art, and by functional innovations connected with the iconostas, a partition between the church altar and the worshippers. The iconostas grew in size, in the course of several centuries, from a low screen to an enormously high wall covered with row upon row of icons. These were arranged in strict order and represented local saints, the Trinity, the apostles, the prophets, and others; since the iconostas were viewed upward and from a distance, both colors and composition had to be varied. The outline was emphasized, the design was made broad and simple, figures were elongated; colors were flat.

Ancient Russian art reached its apogee in the 14th and 15th centuries. Politically these centuries saw the struggle against the Tatar yoke and Teuton aggression, and the beginnings of a unified greater Russia under Moscow. Andrei Rublev (c.1370–1430) is the greatest name of the period. One of his very few remaining authentic icons is the *Old Testament Trinity* (early 15th century). It is the most famous single work of art between the 10th and 18th centuries, vying perhaps only with the icon, *Our Lady of Vladimir,* which is said to have been brought from Constantinople to Kiev in the 11th century. The *Trinity* is an outstanding example of compositional subtlety, rhythm, and brilliant harmony of complementary and contrasting colors.

The next great name is Dionysios (early 16th century), who is known especially for his frescoes at Ferapont monastery. His figures are elongated, their gestures mannered; the tonality is a mixture of colors and tints. He was the forerunner of a trend.

With the consolidation of Moscow under Ivan III and Ivan IV and the conquest of Novgorod, Moscow became the center for all schools and styles. In this interpenetration of schools, each lost its identity. Rublev and Dionysios are as much of Novgorod as of Moscow. The trends started by Dionysios grew. The former anonymity of the iconographer began to disappear, and individual names became prominent. Painting became more complex; narrative elements and scenes from daily life found their way into pictures. Even didactic semipolitical ideas made their appearance, as in *Church Militant,* an allegory of Ivan IV's triumphant return to Moscow from the conquest of Kazan. Attention to detail grew at the expense of the picture as a whole. The trend found the clearest expression in the Stroganov school, named after a fabulously wealthy family of merchant princes, colonizers, and art patrons.

Unlike the earlier icons, the painting of the Stroganov masters is no longer a *Biblia pauperum* (Bible of the poor). It lacks the folk quality of Rublev. It is an art which expresses the taste of its wealthy patrons, an art of endless refinements. Although the artists try to stay within the Byzantine tradition, influences from Iran and India are evident. The tiny pictures have an enamel-like surface glittering with delicate tints and silver, which go well with the jewel-encrusted gold frames.

The middle of the 17th century witnessed a great expansion of international trade, the introduction of foreign methods in manufacture, and the importation of foreign artists. In a special section of the czar's state armory about 60 foreign artists were employed—Dutch, German, Polish, and others, including an Arab and a Persian. Their task was to design coins and emblems, to make architectural drawings, to decorate palaces, and to paint *parsunas* (persons, i.e., portraits). They taught their trade to Russian artists and their far-reaching influence led to violent conflicts which were resolved in favor of *friaz* (western European methods).

Simon Ushakov (1626–1686) was the leading master of *friaz* painting. Varying a famous phrase by Shakespeare, Ushakov wrote that art must emulate the unique quality of the mirror to reflect nature faithfully. In his own practice, however, he did not go quite so far. His paintings combined abstract Byzantine conventions with western European realism of detail. Correctly drawn and correctly lighted parts of a picture are often combined in a manner utterly unrealistic. Ushakov's followers carried this tendency to fantastic lengths: buildings have no beginning or end; figures are related to each other by subject but lack a correct spatial relation to background. Detail crowds upon detail in a combination of great virtuosity. The colors have neither the monochrome quality of Kiev nor the brightness and purity of Novgorod; they are rather a blending

of intermediate tints and shades. The *Annunciation,* which Ushakov painted jointly with Yakov Kondratiev and Gavrila Kazanets, typifies an entire trend of the time as well as these individual artists.

Under Peter the Great (1672–1725, q.v.) secular art rose to pre-eminence, but Byzantine painting did not disappear. It continued in a subordinate role throughout the 18th and 19th centuries. In the villages of Palekh, Mstera and Kholui, where iconography had been practiced for centuries, the ancient technique continued up to the postrevolutionary period, when it was used with success in the portrayal of Soviet themes.

Art in the 18th Century.—Peter the Great completed with one drastic blow the disintegrating process in art and society that had begun half a century earlier. He continued to use the artists of the state armory; one of these was A. F. Zubov, a follower of Ushakov, who was the first to record the rise of the city of St. Petersburg in numerous views. Peter imported more artists from other countries and began to send Russian artists abroad to study. During Peter's reign and for years afterward, portraits retained the flatness and rigidity of the 17th century *parsunas,* even when painted by artists like I. Adolski, I. P. Argunov (1727–1802), I. Y. Vyshnyakov (1699–1762), and A. P. Antropov (1716–1795). All these had received European training but divided their time and allegiance between the new secular subjects and the old iconography.

Peter, Elizabeth (1709–1762), and Catherine the Great (1729–1796), qq.v., wanted to create in St. Petersburg a rival of other great European capitals. They built in rapid succession palaces, churches, forts, mansions, monasteries, where painters and sculptors were employed, under the supervision of the architects, to decorate walls, panels, and ceilings with allegories drawn from classical antiquity. For a time portraiture was relatively neglected, but it soon regained a status equal in importance with decoration. Where decoration was intended to surround court and nobility with pomp and splendor, portraiture emphasized the importance of the active commanding individual. The first stilted efforts of Vyshnyakov and Argunov were succeeded by the accomplished classical portraiture of F. S. Rokotov (c.1730–1810), Dmitri G. Levitski (1735–1822) and V. L. Borovikovski (1757–1825).

The great period of Russian classicism received its most powerful inspiration from French revolutionary classicism as exemplified by Jacques L. David (1748–1825, q.v.). The revolutionary perturbations that shook Europe were accompanied by peasant uprisings in Russia, which threw the monarchy and court into extreme terror. Yet some among the nobility and the intellectuals saw in those very events the need for popular reform. The Academy of Arts (organized in 1758 and officially established in 1764) was the creation of the court and a pillar of conservatism. Yet it was the carrier of the progessive classical ideal. A. P. Losenko (1737–1773), G. I. Ugryumov (1764–1823), and V. K. Shebuyev (1777–1855) chose themes from both classical antiquity and ancient Russia, which they interpreted to convey the ideas of civic duty, self-restraint, and sacrifice for the good of the nation. Popular heroes like Minin and Pozharski became favorite subjects. The most radical among all the artists was undoubtedly I. Yermenev. His peasants are drawn with a downright honesty and a vigor unique for the period, and Yermenev himself participated fittingly enough in storming the French Bastille. In portraiture the trend toward realism was particularly developed in paintings of untitled persons, as in Levitski's *Diderot* (in contrast to the idealized image of Catherine) and Borovikovski's *Madame de Staël.* This tendency was equally powerful in sculpture, in works by M. I. Kozlovski (1753–1802) and I. P. Prokofyev (1758–1828), and especially in the splendid portraits by F. I. Shubin (1740–1805) (*Lomonosov*) and the statuary of I. P. Martos (1752–1835) (*Minin and Pozharski*).

Art in the 19th Century.—In the first quarter of the 19th century, with reaction in the saddle both at home and abroad, classicism degenerated into mere formalism. The enormous pictures of K. P. Brulov (1799–1852) (*The Last Days of Pompeii*) and F. A. Bruni (1799–1875) (*The Brass Serpent*) adhered with great competence to all the academic canons of classical composition, but were cold and rhetorical in content. Hope of progress now lay in the field of realism. Alexander Ivanov (1806–1858), a forlorn figure, wandered between classicism and realism, between piety and enlightenment, and achieved an incompleted masterpiece in *Christ Appears to the People.*

In the meantime I. M. Tankov's 18th century Italianate Russian peasants began to put on a more authentic Russian dress in A. G. Venetsianov (1780–1847) (*Reapers*) and V. A. Tropinin (1776–1857) (*Lace Makers*). It was Venetsianov who enunciated the admirable principle that an artist must paint not "à la Rembrandt" or "à la Rubens" but "à la nature." Though he did not quite live up to his own principle, some who followed him did. P. A. Fedotov (1815–1852), the satirist of middle-class society and impoverished nobility, was the link between Venetsianov and the next important school, called The Travellers, which was aggressively Russian, vigorously realistic, and frankly propagandistic.

The Travellers: V. V. Pukirev (1832–1890), V. G. Perov (1833–1882), V. E. Makovski (1846–1920), V. M. Vasnetzov (1848–1927), Ilya Repin (1844–1930), Vasili V. Vereshchagin (1842–1904), G. G. Myasoyedov (1835–1911), K. A. Savitzki (1845–1905) strove for "contents worthy of a thinking mind." In content, their work dealt with every social injustice they observed in the surrounding world. They flayed religious superstition, marriage for money, the butchery of war; they pictured downtrodden suffering peasants, gluttonous priests, penurious students, corrupt *chinovniks* (bureaucrats), starving artists. They brought realism into historic painting (V. G. Shvartz, 1838–1869; Vasili I. Surikov, 1848–1916), into religious painting (N. N. Ge, 1831–1894; I. N. Kramskoi, 1837–1887), into landscape (I. I. Shishkin, 1831–1898; A. K. Savrasov, 1830–1898; I. I. Levitan, 1860–1900). Sculpture lost the pre-eminence it had held in the 18th century. Academic classicists like F. P. Tolstoy (1783–1873) and G. R. Zaleman (1859–1911), romanticists like Boris I. Orlovski (1787–1839), naturalists and psychological realists like N. S. Pimenov (1812–1864), Mark M. Antokolski (1843–1902), V. A. Beklemishev (1861–1920), impressionists like P. P. Trubetskoi (1867–1938), and A. S. Golubkina (1864–1927), archaists like S. T. Konnenkov (1874–) and D. S. Stelletzki

(1875–) typify and summarize every school of the 19th century.

The political and social movements of the 1860's and 1870's were followed by the reaction and hopelessness of the 1880's and 1890's. The young labor movement born of the country's industrial expansion found but a pale echo in art (N. A. Kasatkin, 1859–1930; A. Y. Arkhipov, 1862–1930). The Travellers were rebels of an earlier day, but in clinging to a peasant orientation they were now outdated, both for those who demanded a bolder social approach to art and for those who wanted no social message in art at all. The latter were in the majority. It was a period of mysticism, retrospectivism, individualism in every form. The social theme was in decline. In the ascendant were Levitan's landscapes of mood, M. V. Nesterov's (1862–1942) and Vasnetzov's revivals of religious and nationalist motifs, M. A. Vrubel's (1856–1910) imaginative symbolism, A. V. Riabushkin's (1861–1904) idealizations of Moscow's past, V. E. Borisov-Musatov's (1870–1905) elegiac nostalgia for the cherry orchards of his childhood.

All these soul searchings were brought into focus at the turn of the century by the World of Art, a group of artists who issued a publication of the same name. They were outspoken individualists, disillusioned with the people and with social idealism. They sneered at the sermonizing of The Travellers; they held that a preoccupation with moral, social or other problems serves only to debase art, and that aesthetic pleasure is the beginning and end of creative activity. In preference to The Travellers' tragic themes done in gray and somber colors, they painted gay and frivolous themes in bright colors. They painted exotic subjects from the colorful East, from ancient Russia, from mythology, and fairy tales, and themes from the high life of 18th century France and Russia. They liked to picture with soft irony the perfumed robes and refined manners of the aristocratic idlers who passed their days gaily in rococo palaces or pursued amatory adventures in shady bowers, near spouting fountains. They excelled in theatrical decoration, especially in sets in which color is dominant, creating the mood of the play. The leading figures in this group were Vrubel, A. N. Benois (1870–), K. A. Korovin (1861–1939), A. Y. Golovin (1853–1930), L. S. Bakst (1866–1924), C. A. Somov (1869–), Nicholas K. Roerikh (1874–), V. A. Serov (1865–1911), Y. Y. Lancerai (1875–), M. V. Dobuzhinski (1875–); and later, S. Y. Sudeykin (1884–), B. D. Grigoryev (1886–1939), A. V. Yakovlev (1887–1938), B. M. Kustodyev (1878–1917), K. S. Petrov-Vodkin (1878–).

The artists P. P. Konchalovski (1876–), A. V. Letulov (1882–), V. V. Rozhdestvenski (1884–), I. I. Mashkov (1881–), and R.R. Falk (1886–) organized a group called The Jack of Diamonds (1909–1910) and translated the art of Cézanne into a more colorful Russian version. The futurists, led by David D. Burlyuk (1882–), gave an initial "slap in the face of public opinion," but their full development did not come until the October Revolution.

Art Since 1917.—During the revolution the Soviet government was busy fighting famine, intervention, and counterrevolution; the field of art awaited a resolute group to assume control and guidance. Which group or tendency could aspire to the role? The World of Art was patently antidemocratic and was tainted by the association with such enemies of the revolution as Hippius, Filosofov, Rozanov. Furthermore, two members of the group, C. A. Somov (1869–) and A. N. Benois (1870–), during the most critical years of the revolution issued their two graphic series *Le Livre de la Marquise* and *Versailles*. Anything more foreign to the spirit of the revolution would be hard to imagine. The Travellers had lost all their former fire of revolt. The futurists stepped into the breach and with the consent of the government took immediate direction of the art institutions and art policies of the country.

At first they went about their task with will and intelligence. It was obviously a period of change and transformation. The old was to be thoroughly uprooted and the new installed in its place. The futurists set out to bring all this about. They abolished the hated Imperial Academy, founded the Free Workshops in its place and reformed the entire art education of the country. They helped to reorganize the old museums and to open many new ones. They helped in transferring private art collections to the state and opening them to the public. They issued new publications, arranged lectures, and established art-study circles and clubs in the army, navy and factories. They helped organize artists into a union, planned competitions for monuments to revolutionary heroes, established state commissions to purchase the work of artists. They staged revolutionary artistic festivals on a gigantic scale. They even performed one service that would appear alien to their profession. Several of the group, led by Vladimir V. Mayakovski (1894–1930), V. V. Lebedev (1891–) and A. M. Lavinski (1893–), despite their abstractionist theory turned out many hundreds of propaganda pictures for the Russian telegraph agency (*Rosta*). Simple, crude, but often strikingly effective, these pictures proved enormously helpful to the government in agitating against foreign intervention and domestic sabotage, in building discipline in the army and in accomplishing industrial rehabilitation.

The futurists did not present a solid front. Among them were expressionists like V. Kandinski (1866–1944), P. N. Filonov (1883–), D. D. Burlyuk, and Marc Chagall (1887–); cubists like A. A. Morgunov (1884–), N. A. Udaltzova (1886–), L. S. Popova (1889–), and A. Pevsner (1886–); and suprematists like K. S. Malevich (1878–1935), A. M. Rodchenko (1891–), E. Lissitzki (1891–); and representatives of other trends akin to the modernism of western Europe. An active core, however, rechristened itself into comfuturism (communism-futurism) to denote their revolutionary orientation. These comfurturists saw in the collapse of the old social system the collapse also of the art which it had engendered, namely, realism in every form, whether literal or distorted. They sought a closer equivalent of the creative forces of the revolution. They found this in Lenin's constant demand for the development of industry and the training of specialists to run it. They called the new art constructivism. "Constructions" were neither paintings nor sculpture but both. They were made of materials which form the daily environment of workers in industry, and which are the true product of modern science: steel, concrete, glass, paper, coal. The

constructionists hoped to combine those materials in such a scientific manner that the worker's collective effort would be reflected in them, that the "constructions" would transmit to the spectator the constructive spirit of the age and make him thereby a convert to it.

Two examples of "construction" will be described: N. A. Altman's (1889–) *Russia* is a rectangular board near the lower narrow base of which the Russian *trud* (labor) is skilfully inlaid in such a way that the letter R, standing for both Russia and revolution, rises diagonally to the top. The spaces between the unevenly sized letters are filled by abstract patterns of metal, coal, ebony, and paper finished in a variety of surface textures. This piece of meticulous craftsmanship was supposed to symbolize the powerful reality of the revolution and its glorification of labor.

V. A. Tatlin's (1885–) monument to the Third International was to be built in the form of a huge, iron spiral (*Symbol of Liberated Humanity*) 400 meters high, and leaning at an angle of 45°. Within this leaning tower of Moscow were stories to be encased in the form of a cylinder on top of a pyramid on top of a cube. These were to revolve, each on its axis at the velocity respectively of a day, a month, a year. This monument was designed to meet the formal demands of aesthetics and the concrete demands of utility. There were many other projects and constructions of similar design.

The futurists were uncompromising in their theoretical attacks on the older forms of art. One of their number, Arvatov, believed that easel painting was a product of capitalist market relations and said, "The problem of the Revolution in art is the problem of liquidating easel painting." Their exuberance, however, was restrained by government authority. Gradually, they and other modernist movements began to lose ground. The country was slowly settling down to a stable existence. The masses returned to normal occupations; youth sought education, soldiers returned from the front. People who sought in art a clear picture of the seething events, who wanted encouragement and guidance, found little in the futurist work to satisfy them. And these people, represented by their various organizations, clubs, and unions, were now the consumers of art. At the same time, the academicians, orientalists, impressionists, began to air their views publicly and loudly. They had never stopped working and exhibiting, though they had remained in the background while the futurists were busy with their reforms. They now came forward more boldly, and new organizations began to spring up, each with a special declaration of principles.

The most important organization in number of members, the ambition of its plans, and the public acclaim it received, was AKHRR (Association of Artists of Revolutionary Russia). It was formed during a discussion meeting at the 47th annual exhibition of The Travellers. The young organization thus paid a tribute to the old but carried forward its heritage with this important difference: The Travellers had always taken a negative stand toward the society in which they were born; the stand of the AKHRR was one of affirmation. The declaration of principles proclaims:

"Our civic duty to mankind is to fix in artistic and documentary fashion the greatest moments of history in all their revolutionary upsurge.

"We shall depict our own day: the life of the Red Army, the life of the workers, the peasants, the revolutionaries, the heroes of labor.

"We consider content the sign of genuineness in a work of art."

To illustrate these principles a series of large exhibitions was circulated throughout the Soviet Union under such titles as "Life and Labor of the Red Army," and "Life and Customs of the Minor Nationalities." The membership of AKHRR, notably A. D. Drevin (1889–), Konchalovski, Kustodyev, K. F. Yuon (1875–), Kasatkin, I. I. Brodski (1884–1939), included many schools ranging from cubism to naturalism. As the organization grew, its program broadened to include landscapes and still lifes as subject matter, along with "Life and Labor." The painting that caused perhaps the most heated debate in a decade was Brodski's *Second Congress of the Comintern* (1924). In an attempt at collective portraiture, the presidium, committees, orators on the platform, Lenin, Stalin, Molotov, and international delegates from all corners of the earth, about three hundred individual persons in all (including the artist in one corner, painting the picture), were portrayed with the most scrupulous fidelity. The painting was widely exhibited and reproduced, and was attacked and defended with equal vehemence.

Other artists' societies existed alongside AKHRR. The most notable were the Four Arts, a group of famous mature artists: Petrov-Vodkin, P. V. Kuznetsov (1878–), M. S. Saryan (1880–), A. V. Shevchenko (1886–), V. A. Favorski (1886–), and The Society of Easel Painters including some of the most gifted young artists trained after the revolution: A. A. Deyneka (1899–), A. A. Labas (1900–), Y. I. Pimenov (1903–), P. V. Williams (1902–), A. G. Tyshler (1898–), D. P. Shterenberg (1881–).

During the decade of AKHRR's existence, when one artists' circle after another declared its allegiance and offered its co-operation to the Soviet government, a small militant group, more political than aesthetic, the RAPKH (Russian Association of Proletarian Artists) raised a clamor under the slogan "Ally versus Enemy" —"Enemy" including by implication some of the best Russian artists. As earlier in the case of comfuturism, the authorities quickly stopped the deliberate creation of a cleavage among Soviet artists. After the famous decision of 1932, all Soviet artists regardless of aesthetic persuasion were organized into one Federation of Soviet Artists.

After that the range of themes grew wider. Artists cultivated whatever genre seemed most suited to their particular aptitude. The younger artists more readily turned to social themes, while others preferred landscape or portrait. Soviet art had come to embrace not only the heroic Soviet theme of "Labor and Defense," but also Soviet fields and forests and the products of Soviet soil. Government recognition and rewards, including prizes and titles, were extended equally to Nesterov, famous as a painter of religious subjects; to Saryan, a Fauve; to Konchalovski and Tyshler; the Kukryniksi, from the names: M. N. *Ku*priyanov (1903–), P. N. *Kry*lov (1902–), *Nik*olai A. *So*kolov (1903–), a trio of satirists; and even to the Palekh artists,

direct spiritual descendants of the ancient Russian iconographers.

Soviet art was fast becoming multinational; the Uzbeks, Turkomen, Ukrainians, Bashkir, and others made substantial contributions to the body of Soviet art. Amateur art grew phenominally in factory, farm, army and navy. Sculpture followed parallel paths, though on a greatly reduced scale. Among the well-known sculptors were I. M. Chaikov (1888–), M. N. Manizer (1891–), S. D. Merkurov (1881–) (statues of Lenin and Stalin), Domogatski, N. A. Andreyev (1873–1932) (portraits of Lenin), V. A. Andreyev (1890–) (statue at top of Soviet Pavilion, World's Fair, New York), P. V. Sabsai (1893–), I. S. Yefimov (1878–) (animals), A. T. Matveyev (1878–), G. I. Motovilov (1892–), I. G. Frikh-Khar (1893–), B. D. Korolev (1885–), S. Tavasyev (1894–), and the women sculptors N. V. Krandiyevskaya (1892–), V. I. Mukhina (1891–1953), (*Soviet Youth* at Paris International Exposition), and S. D. Lebedeva (1906–). The list omits many names but suggests the most characteristic trends. The artist's economic security has been guaranteed by the constitution, and his audience was counted in millions.

Such was the state of Soviet art on the eve of the Second World War. The respect in which art was held and the artist's complete integration with the life and culture of the country, inevitably led artists to throw their efforts wholeheartedly into their nation's gigantic struggle for its very existence. The first war posters began to appear on the day after hostilities opened, and they continued in a never ending stream throughout the war; many artists went to the front as correspondents. Most artists, however, were not thus directly involved in the war, and they continued to work as formerly, though the war theme touched most of them. As the war continued many artists turned for subject matter to great historic events in Russia's past.

A brief mention of characteristic pictures and exhibitions will illustrate the state of Soviet art during the war. About a year after the war began, an all national exhibition was held under the title "The Great Patriotic War." Typical exhibits were: *Driven into Slavery* by G. G. Ryazhski (1895–), *The Peoples' Avengers* by G. K. Savitski (1887–), *Blood Donors* by Konchalovski, *Artillery Attack* by Deyneka. Some historic themes were: *Alexander Nevsky* by Lancerai, *Stepan Razin* by V. S. Svarog (1883–), and *Ivan the Terrible* by P. P. Sokolov-Skalya (1899–). Many landscapes and sketches from the front were also shown. An exhibition held on the twenty-fifth anniversary of the Red Army was called "Red Army in the Fight Against the Fascist Aggressor." Very dramatic was the work done by Leningrad artists during the blockade of 1941–1942. Though every one, including the artists themselves, was half-starved and half-frozen, the artists bolstered public morale by posters, streamers, postal cards, wall decorations, easel pictures, drawings, and sculpture which showed how the city was fighting the enemy, defending its children, preserving its cultural treasures.

On the twenty-fifth anniversary of the October Revolution, A. M. Gerasimov (1889–) was awarded the Stalin Prize for his painting *The Hymn to October,* which is significantly both like and unlike Brodski's *The Second Congress of the Comintern,* painted two decades earlier. *The Hymn to October* represents the plenary session of the Supreme Soviet held at the Bolshoy Theater to celebrate twenty-five years of Soviet power. Stalin, the commissar of defense, is speaking, and in the presidium along with Molotov and Kaganovich are the marshals of the Soviet Union in full regalia. The many nationalities of the sixteen republics are in the hall. In the loges can be recognized Moskvin, Mikhoels, Shostakovich, Mukhina, Grabar, and about two hundred other representatives of Soviet art and science.

Almost every nationality held its own wartime exhibition dipicting its part in the war. The Tadzhik Republic, on the very border of India, held an exhibition, "The Tadzhik People in the Patriotic War." Some of the titles were: *Evacuated Children in Tadzhikistan, Presents for the Red Army,* and *Muhamed Ibrahim, Hero of the Soviet Union, Son of the Tadzik People.* There were also various special exhibitions. "In the Rear of the Enemy" showed work done by partisans behind enemy lines. "Exhibition in a Forest" showed pictures by Red Army men; the works were both created and exhibited near the fighting lines. Many exhibitions had no direct reference to war; said *Literature and Art,* March 1943: "Excellent . . . painters of landscape and genre, in their eagerness to serve the country turn to themes of war . . . this is a wrong conception of art's social significance . . . It is not necessary to violate the nature of one's own gifts." "Veterans of Russian Art" gave full-sided retrospective showing of some of the oldest living artists: V. K. Byalynitski-Birulya (1872–), I. E. Grabar (1871–), B. N. Baksheyev (1862–), I. N. Pavlov (1872–), Lancerai, and Yuon. The exhibition was warmly received and all the artists were awarded the Order of the Red Banner.

As defeat of the hated enemy drew near, Russian artists were planning for the peace. For example, the Soviet press reported that immediately after the liberation of Kiev, Ukrainian artists and art students returned from temporary quarters in Tashkent, Alma-Ata, Ufa, and Samarkand. They held a four-day conference with the participation of artists from Armenia and the RSFSR. Reports described the extent of the destruction of cultural monuments and plans were made for their restoration wherever possible. Among activities planned for the future were: the revival of Ukrainian folk art, the commemoration in painting and sculpture of heroic Ukrainian struggles against the Germans and the reorganization of art schools and museums. According to the official Communist viewpoint, art also is a political weapon influencing the minds of people. Capitalist art is considered to have been realistic and progressive until the formation of the industrial proletariat, after which it allegedly declined along with capitalism. In contrast, Soviet art is claimed to be excellent, because it reflects Communism. The USSR condemns the principle of "art for art's sake," and asks its artists to be political. This policy was intensified since World War II, with repeated warnings that Soviet artists must avoid Western influence.

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6. ARCHITECTURE. European Russia, from the Gulf of Finland to the Caucasus, and from the Polish marshes to the Urals, is flat. This geographical fact has had a profound influence on Russia's history and on its architecture. Great plains and navigable rivers make natural trade routes. But where nature aids commerce it also encourages invasion.

Warriors from Scandinavia founded the Russian state in the 9th century and wood architecture of strong national character developed in northern cities and in the southwestern Ukraine. This type of building was similar to the log cabins of America. From the south came other influences when the young empire was converted to Christianity. Byzantine culture brought with it the art of building in stone.

In the 13th century, these influences were for a time submerged under the conquering Mongol khans from the East. Evidences of Mongol culture still survive in the Volga region. In the Crimea, the Tatars left the imprint of their 300 years' rule. During these occupations, the wood architecture of Russia was largely destroyed and the art of building virtually died. Mainly in the far north, in the Novgorod and Archangel districts, did any important wooden structures escape the torch and sword of the invaders. Many stone churches, monasteries and other religious buildings in various regions survived and served occasionally as substantial fortresses.

By the 15th century the Tatars had been driven from the great plains, and Moscow became the political and religious center of Russia. An intensive period of court and ecclesiastical construction began in the reign of Ivan the Terrible in a style peculiarly Russian though it embraced the original Byzantine motifs and newer influences from Italy. This trend continued until the 18th century when Peter the Great (1689–1725) built his new capital, St. Petersburg. Peter was determined to westernize his country including its architecture. He employed many foreign architects and engineers, most of them French and Italian. The classical style which they brought took strong root in Russia and is still highly regarded by Soviet architects.

First Period (10th–18th Century).—Russia, like the United States, is a country of vast forests. Even recently wood was the dominant building material. Except for the most important churches, entire cities were built of wood. But since wood is perishable (who will forget Tolstoy's description of burning Moscow in *War and Peace*), the recorded history of Russian architecture begins with the oldest stone churches.

The earliest important church is the Cathedral of St. Sophia in Kiev (1020), where Vladimir the Great established the first seat of a metropolitan of the Greek faith. This cathedral with its Syrian and Persian features stemmed almost directly from Byzantine prototypes. But, as the new faith swept northward, the Russian genius for adaptation made many stylistic modifications in architecture. In the Pokrov Church near Vladimir (1163) we see a lessening of Byzantine influence along with a happy blending of Romanesque details. With its wonderful setting on the Nerl River, its simplicity of form, its white stone and gay decorations and its single golden, bulb-like dome, this church is perhaps the loveliest historical monument in all Russia.

Another 11th century cathedral is St. Sophia in Novgorod. Here the great, austere walls show hardly a trace of the rich decorations of Byzantium. But crowning the Romanesque starkness of the exterior are six gilded domes, five of them forming the cluster which became typical of Russian churches.

In this first historical period, religion dominated Russian architecture. But since each church was a center for village life, a vigorous secular architecture of wood developed around the ecclesiastical buildings. During the Tatar invasion, these wood structures strongly influenced even the churches in northern cities. Some were built square, with great log walls. At some distance from the ground, the square was transformed into an octagonal tower by means of unique little arches called *kokoshniki.* The tower itself was topped by a steeply pitched, pointed roof. The Kolomenskoye Church near Moscow (1532), almost literally translating such wood architecture into stone, is a striking example of the power of native tradition.

Architectural historians of the past were wont to call old Russian architecture "semibarbaric" or "Asiatic." The 19th century French architect, Viollet-le-Duc (q.v.), though he never visited Russia, did much to acquaint western Europeans with Russian architecture. He discerned various Oriental influences: Russian churches reminded him chiefly of Chinese pagodas, Hindu temples, Arabian mausoleums, and Byzantine cathedrals. Without overlooking the influence of the East, modern scholars, particularly Russians, have found truer analogies in western European architecture.

In the far-away corners of Europe, particularly in the Russian north, a patriarchal pattern of life and an agricultural economy continued longer than elsewhere. The Romanesque foundation of folk art and building survived later here than in the West, and the influence of wood architecture and ornamentation on stone churches is in evidence everywhere. It is through considering the interplay of foreign culture with vigorous folk art and stubborn native traditions, rather than in observing a few externals, that

we see the true Romanesque nature of old Russian architecture.

Moscow was the center of the later part of this first period of Russian architecture. In the 14th and 15th centuries, master builders from Novgorod and Pskov built palaces and churches of incredible splendor to express the political and religious power of the czars. To rebuild the Moscow Kremlin, Ivan the Terrible imported Italian architects who brought the styles and construction techniques of Europe. For several centuries, this foreign influence was combined with the inevitable Russian flavoring to create many noteworthy structures, the most important of which is the Kremlin itself. The centers (kremlins) of most large Russian cities were enclosed by strong, battlemented walls, which protected the palace and government buildings, and the principal cathedrals, churches and houses. The Kremlin wall in Moscow, built by Antonio Solario in 1490, is of great architectural interest. Although reminiscent in some details of Asiatic fortress walls, it has a native character of its own. Towers of many different styles and form are incorporated in the great wall, the most important of these is probably the Spasskaya Gate in Italian Renaissance style. Interesting old plans have been found in the archives showing the Kremlin redesigned along classic lines. Happily the plans were never realized.

Inside the Kremlin is an extraordinary grouping of secular and religious buildings designed by Russian as well as foreign architects. The Ivan Veliki (great) tower, finished in 1600 by Boris Godunov, is outstanding because of its dome-topped height and splendid design. Surrounding it are many churches with characteristic bulblike domes, convents, and secular buildings, including the Granovitaya or "lesser palace" designed by Italians. The fondness for grouping buildings, especially churches, is typically Russian. Similar free and almost spontaneous compositions are found in every corner of the land, and the same tendency is reflected in the multidomed churches found everywhere. A famous example is the cathedral of St. Basil, built in Moscow's Red Square in 1554 by Ivan the Terrible, with its numerous lanternlike domes and spires. It should be mentioned that the name Red Square did not originate, as many believe, with the revolution. In Russian, the words "red" and "beautiful" are synonymous. Red Square got its name centuries ago when it was Moscow's principal trading center or bazaar. This square had still other uses, however. Ivan the Terrible had his political enemies, the boyars, executed there, and Peter settled accounts in Red Square with the Streltsi (Imperial Guard) who rose against him.

In summary, we may say that medieval Russian architecture does not compare in some ways with the great architectures of the world. Many influences retarded its development. Geography encouraged destructive invasions of Russia. The long-lived feudal economy and the cleavage between the Greek and Roman church were constant barriers to the assimilation of Western civilization. The religious hierarchy restricted architectural innovations and even tried to establish a standard, five-domed church. The Russians relied too frequently on foreign talent, and yet their architecture was vigorous and individual.

Second Period (18th Century to 1917).—Peter the Great was a purposeful man. When he decided to change the backward empire into a modern Western nation he broke literally with the past. He moved the capital to the marshy banks of the Neva where it joins the Gulf of Finland because here was the best "window on Europe" he could find. Both to symbolize and to help execute his purpose he began to import outstanding architects; among them were Leblond from France, hired to make the city plan of St. Petersburg; Carlo B. Rastrelli, Quarenghi, and Rossi from Italy; Cameron from England. He also assembled the noted Russian architects of his day and forcibly gathered up the best masons, carpenters and craftsmen in his realm. To create St. Petersburg as his paradise without rival, he issued a decree that henceforth no stone building could be constructed anywhere else in Russia.

Peter's methods brought results. The classic and baroque designs of the architects were soon translated into stone on a vast scale. After Peter's death in 1725, the momentum of his plan continued under Catherine the Great (1762–1796), aided by foreign court architects and the growing group of Russian masters. By the 19th century, the northern capital was one of the finest cities in Europe. Its systems of great boulevards and monumental open squares, frequently designed by a single architect, served as a worldwide example of city planning and established a deep tradition that is continued today by Russian architects.

According to contemporary accounts, Catherine was greatly interested in architecture; she took personal supervisory charge of many projects, examined buildings and plans, and offered original suggestions. Peter's stone decree was forgotten and the new architecture spread to Moscow and other cities.

As a result of Peter's ideas about commerce and industry many secular buildings were completed during his reign and in the decades following his death. Important examples are the Admiralty (1806) by Sakharov, in the Mining Institute (1806) by Voronikhin, the famous Winter Palace (1732) by the great architect, Rastrelli, the Tauride Palace (1783) by Starov, and the National Museum and Alexander Theater by Rossi (1819–1832). Many of these were built in a sort of Russianized version of Italian baroque. With the reaction in Europe against the excesses of baroque, Russian architecture also became more austere. The Corinthian order gave way to the Doric; the Roman style to early Hellenic. The Hermitage, reconstructed as a museum in 1839 by Leo von Klenze, was in a restrained neo-Greek style. The most striking of St. Petersburg's religious buildings are the Kazan Cathedral (1801) by Voronikhin and the huge Cathedral of St. Isaac (1819) by de Montferrand, both in classic style.

Although St. Petersburg was the new capital, 18th century Moscow continued to grow as a trading center. Architecturally, it tended to cling to the older Russian style, particularly in its churches. But since Moscow was the favorite abode of the nobility, many splendid town houses were built which aped the capital's neoclassic style. Examples are the residence of Prince V. N. Gagarin (1817) and the extraordinary façade of the stable on the estate of Prince Golytsin (1823); the latter might well have served as the entrance to a railroad terminal or museum. Out-

side of Moscow and in other parts of the country, numerous elaborate mansions with pillared porticoes and classic details were built by the landed aristocracy who had an inexhaustible supply of serf labor. Many scenes of Leo Tolstoy's novels and Anton Chekhov's plays were laid in these grand houses so reminiscent of the mansions of our own Old South. All this architectural splendor was only a thin veneer on the poverty and illiteracy of the great mass of Russian peasants.

Under Nicholas I (1825–1855) the buildings in St. Petersburg and Moscow were of banks, hotels, post offices, and railroad stations. The architecture of these buildings was not very interesting and in general followed the neoclassical style of Andrea Palladio (q.v.).

The two main features of this second period in Russian architectural history were the vigorous adoption of classicism and the extraordinary development of the architecture of great public squares, avenues and river embankments. Both features, but especially the latter, continue in contemporary Soviet designs.

Third Period (Post–1917).—The revolution changed many things. In architecture, it reduced for a time the role of the czarist architects. Those who replaced them had less practical experience with actual building, but they had a close relationship with the European extremists in art: the Dadaists, the surrealists, and the constructivists, whose roots went back to prerevolutionary days. To many young Soviet architects and artists, these radical schools symbolized a protest against the old order. In their work these architects broke completely with the accepted traditions.

The new designs were not only unprecedented but often incredibly naïve in their efforts at literal expression. The plans of the Monument to the Communist International by Tatlin (1918) included an ascending spiral form (never actually built), which was supposed to represent the aspirations of the socialist state. A workers' club by Golosov had a roof in the form of a cogwheel, gears and all. Ladovski attempted to interpret current theories of psychoanalysis through architecture. Yet, some buildings of the time had architectural significance. Melnikov, for example, did outstanding work. In his Tram Workers' Club and in other buildings in Moscow, Melnikov strove to express the new social content with bold forms and with startling technical tricks, such as huge glass windows and great concrete cantilevers.

On the whole, these early architectural experiments failed. The excellent material and the precise construction techniques which would have been necessary to execute the designs were simply not available in Russia in those years. Thus, the effects intended failed to materialize, and when a building was completed the concrete edges chipped and the stucco deteriorated within a year or two. In those turbulent days there was no landscaping to set off the buildings, which did not help matters. Moreover, large glass areas were stressed in the designs, with the result that occupants froze in winter from inadequate heating and suffered in summer from the heat and glare of the sun.

Closely related to the extremist group were the architects of the so-called "international" school. This style grew out of the worldwide technical advances in the science of building. Stimulated by the poverty-economy of postwar Europe, the new architects rejected all nonessentials, and regarded themselves as functionalists. When the vast program of the First Five-Year Plan was set into motion, foreign architects were once more invited to Russia. Many of these—May, Meyer, Schmidt, Lurçat and others—were adherents of the "international" school.

Since most of the Soviet planning and engineering officers were in Moscow, the architectural currents of the whole country flowed from there in those early years. Therefore, many important early examples of the new style are in the capital: a block of urban apartment houses by Ginsburg (1932), the Community Center in the Proletarian or auto works' district of Moscow by the Vesnin brothers (1934), the building for the Commissariat of Light Industry by Le Corbusier (1935), and the impressive home of the newspaper *Pravda* by Golosuv (1936). Other examples are the dam and settlement at Zaporozhe (Dneprostroi) and some clubs at Baku.

These "international" style buildings were characterized by simple façades devoid of ornament and by continuous, horizontal windows and balconies expressive of the structural frame. They resemble buildings of the "international" school in the rest of Europe and of the world, though faulty materials and workmanship still plagued the early Russian experiments. The Russian worker, now that the driving tempo and the uncertainties of the First Five-Year Plan were over, finally had time to look about him. He was not impressed by the new architecture. It was not only often shabby, but to his taste seemed stark and unfamiliar.

History is continuous. Movements which seem to represent a sudden break or cleavage with the past usually prove, on examination, to have been developing for some time. While the International style was flourishing, from about 1925–1935, a third school was growing in influence. Most of its adherents were young Russian men and women who had grown up under Soviet institutions and who had had little direct contact with the outside world. They formed what may be called the neoclassic school; their designs are strongly linked to the classic tradition of the 18th and 19th century Russian cities, particularly Leningrad. During this same period, a number of academic architects of prerevolutionary days, for example, Zholtovski and Shusev, also continued to receive important commissions.

To the Russian people the splendid old buildings and the heroic squares and monuments of their large cities symbolized architecturally the good things of life. Now that the success of the industrialization and agricultural programs was assured, it became at last possible to think of better housing, schools, recreational facilities and hospitals, not only for the few but for everyone. The popular interest in architecture grew more powerful and decisive daily. Public preference for the classical was expressed in the press, on the radio and through popular participation in choosing the winners of numerous architectural competitions. Moreover, neoclassicism linked directly with a tradition which was in evidence everywhere, and which had the advantage of being native rather than foreign. Noteworthy examples of this new classical trend are the stately, restful sanatorium at Sochi (Black Sea) by Kuznetsov, the Moscow Hotel by Shusev (1936), and, perhaps most outstanding, the star-

shaped, porticoed Theater of the Red Army in Moscow by Karo Alabian (1938).

Parallel developments were occurring in many republics of the Soviet Union. Stalin encouraged the national minorities throughout the USSR to express their cultures in architecture as well as in the other arts. In Armenia and Georgia, the sheltering greatness of the Caucasus and the skill of the early Christian stone builders have helped preserve many architectural monuments. The church in Talin, Armenia, dates from the 7th century; ancient monuments like this still deeply influence the architecture of Transcaucasia. In 1942, A. Tamanyan was awarded a Stalin Prize for his Government House in Erivan. It is built of local, rose-colored tufa, in a style reminiscent of the old stone architecture. Curiously enough, Tamanyan, who was schooled in the classical traditions of the St. Petersburg Academy of Arts, returned with Soviet encouragement to carry on the proud native traditions of Armenia.

In the Central Asian republics there is an equally intense interest in the historical monuments of their again-great cities. Ancient Samarkand, with its magnificently colored tomb of Timur (14th century) and the exquisite 15th century street of tombs, Shah-i-Zind, is a model for comtemporary Uzbek art. Many critics considered the Uzbek national pavilion the most beautiful building at the 1939 Agricultural Fair in Moscow.

The shift from the functional style was much criticized in certain foreign architectural circles. Some critics felt that the new architectural accent, with its emphasis on national forms, in the Russian and other republics, meant an abandonment of the international ideals of socialism. Others, identifying the classic styles of their own countries with conservatism in government and finance, felt that only the most advanced architectural forms could express the Soviet experiment. Similar controversies sprang up around parallel developments in Russian music, art, and literature.

Since most critics had no direct contact with the situation, they were unaware of the popular dissatisfaction in the Soviet Union with extremist, nondecorative styles. They were equally ignorant of the history of Russian art and architecture and of the intense poular pride in native traditions. They were also naïve in attributing political significance to so-called International or revolutionary art forms. A basic characteristic of Soviet architecture is variety in activities and trends. Its history shows it has been in a constant, vigorous state of flux, in which fixed rules never for long impeded natural creative forces. It cannot be adequately judged by isolated examples which reach the observer.

The state of Soviet architecture is well described in a quotation from a speech made in New York in 1939 by Karo Alabian, president of the Society of Soviet Architects and co-designer of the Soviet Pavilion at the New York World's Fair: "In our country, architects of *all* tendencies—classicists and constructivists—meet in creative competition. . . In the reconstruction of Moscow and other cities, architects, representing widely divergent trends, such as Vesnin, Boris Iofan, Zholtovski, Ginsburg, Golosov, Melnikov and Mordvinov—all have had a part."

Still another architectural school has appeared on the Soviet scene; it is a sort of modernized version of the classic styles. It has met great popular approval and during the postwar period it will probably develop more broadly than the more frankly classical school. The new trend is identified largely with one man, Boris Iofan, who achieved international renown by winning competitions for designs of the Palace of Soviets (1932), and of the pavilions at the Paris Fair (1937) and the New York Fair (1939). Iofan's works are characterized by simple, strong masses which, because of his early training in Rome, are never too far removed from the popular, classic tradition. Prominent sculptors, decorators and mural painters have collaborated with him in his best buildings. The great stainless-steel figures surmounting the Paris and New York pavilions suggest significant future architectural development.

Two factors above all others are influencing Soviet architecture after the Second World War. First there is a need to commemorate the patriotism and heroism of the great struggle. Architects attempt to do this not only in pure monuments but in the architecture of everyday life: in houses, schools, hospitals, public squares, and even in whole blocks and neighborhoods. In all this, national traditions play a large part, but the most significant aspect of Russian tradition relates to the architectural composition of buildings, to the harmonious arrangements of structures, avenues, and squares. Developments in this field reflect the essence of the Russian architectural heritage.

Second, the industrialization of all building trades is being undertaken after the war, and this movement will greatly influence architecture. Before the war, the Soviets wisely devoted their best efforts and resources to branches of their economy which were related to national defense. The field of building lagged behind the more vital industries. In the period of peace, the Soviets emphasize civil construction. Factory-produced building materials and mechanized construction will influence architecture profoundly. Architects of the functional schools continue to play an important role together with their colleagues of the classical and related native traditions.

Housing and City Planning.—The young Soviet Union inherited very bad housing. Peasants and the urban workers were never adequately housed in czarist Russia. Conditions in the old rural villages were inferior enough, but most city workers did not even have privacy. Only in Petrograd (Leningrad) did some workers live in tenements and even here an average of 3½ workers lived in each room. Many buildings were destroyed during the First World War and in the years following, and there was no new construction. Under the Soviets the urban population had doubled by 1939. Moscow and Leningrad grew rapidly. The first step taken by the Soviet government was to redistribute the existing housing more equitably. In Moscow alone over 500,000 additional families were housed in the dwellings of the former middle and upper classes. By 1937 another million were provided with new housing in Moscow. But despite tremendous effort, conditions still remained unsatisfactory. The great postwar task was to double the nation's housing. Even under the stress of war the authorities were preparing to meet this problem;

the establishment of the newest people's commissariat in the USSR, the Commissariat of Municipal and Housing Construction, was announced in May 1944.

Before 1939, much housing was built in new industrial cities such as Magnitogorsk, Komsomolsk, Kirovsk and Stalinogorsk. A number of foreign architects were used on these projects. Many radical experiments were tried and many mistakes were made in this early period. Then followed tendencies in both rural and urban housing toward individual homes and private apartments much in the English and American tradition. The new commissariat proposes that 75 per cent of the Russians made homeless by the war shall be rehoused in one-family dwellings and that "these should be cozy." Such a program needs years of peace.

Because of the extraordinary increase in new urban centers and because of the public ownership of land, the Russians had a great opportunity for city planning, of which they took full advantage. Between 1918 and 1939, the urban population doubled and the number of cities of 100,000 people or more increased from 14 to 74. In the older cities, the need was for reconstruction and expansion. Prominent foreign and native architects submitted planning proposals for Moscow and other cities. Some proposals suggested the wholesale demolition of Moscow; others suggested abandoning the old city and building a new Moscow elsewhere. Obviously, such proposals were rejected; but there development of great cities was begun according to an over-all master plan. The traditional principle accepted for work in this field was that buildings cannot be treated individually but only in relation to each other and to the neighborhood. In general, Moscow was divided for planning or redesign into sections, each of which was placed under the supervision of one architectural group. By 1937, comprehensive plans for the next 10 to 20 years had been prepared for industrial, residential and other areas of most large Russian cities. Both Moscow and Leningrad will have wider streets, better rapid transit, and green belts of parks and forests in accord with Lenin's desire to eliminate too much difference between town and country.

It was possible to plan many new cities from the ground up. In these, industrial and residential planning was based on surveys of local natural resources, topography, and climate. Plans were constantly readjusted in the light of experience. About 1940 the Russians considered 50,000 persons a minimum urban nucleus, and half of all cities, existing and projected, fell in the population group of 50,000 to 1,000,000. The basic planning unit was a super-block of about 20 acres, housing 2,000 to 4,000 people. The typical super-block contained a 22-classroom school and social and shopping facilities.

No historical account of Russian architecture would be complete without mentioning the havoc of the Second World War. The Germans followed a policy of systematic destruction of Russian art. No other nation suffered physical damage of such ferocity and extent. Many ancient cities like Pskov, Novgorod, and Kiev were almost completely destroyed; and many of Leningrad's monuments badly damaged. Yet even during the heaviest fighting Soviet architects and other citizens were working on plans for the restoration of their beloved monuments, and many reconstructions were under way before the end of the war.

Postwar city planning continued during the war. As towns were liberated from Nazi occupation, teams of architects, engineers, and builders moved in with these plans for reconstruction, so that even temporary and emergency building would fit into the master plan.

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RUSSIAN SOVIET FEDERATED SOCIALIST REPUBLIC (RSFSR), largest of the 16 Union republics, occupies the entire northern and central parts of the Soviet Union, from approximately 28° west longitude to the Pacific Ocean. In the RSFSR are included the whole of the tundra and most of the forest zones of the USSR, part of the steppe and forest-steppe zones, while in the south (Black Sea coast) one enters the humid subtropical zone. (See USSR—*Geography.*) About one fifth of the population is non-Russian and forms several autonomous bodies within the RSFSR. The areas with predominantly Russian population are divided into regions or provinces (*oblasts*) and territories (*krais*). The capital of the RSFSR is Moscow.

The development of the people of the RSFSR, and particularly of its economy, is an integral part of the history of Russia before 1917 and, under the Soviet regime, of that of the entire Soviet Union. The RSFSR originated from the Soviet Revolution of 1917, although its formal establishment took place several months later.

In December 1922 the 10th All-Russian Congress of Soviets approved the joining of the RSFSR with three other Soviet socialist republics into one Union. On Jan. 31, 1924, the first constitution of the Union of Soviet Socialist Republics was adopted by the 2d All-Union Congress of Soviets. Following this the constitution of the RSFSR was redrafted, and in May 1925 a new constitution of the RSFSR (the second) was adopted by the 12th All-Russian Congress of Soviets.

When the 8th All-Union Congress of Soviets (meeting in special session) adopted on Nov. 25, 1936, a new constitution for the USSR (the second), the RSFSR redrew its constitution. On Jan. 21, 1937, the 17th All-Russian Congress of Soviets adopted this new constitution (the third) of the RSFSR. Under this constitution all authority is vested in the Supreme Soviet of the RSFSR, elected for a term of four years by universal, direct, equal, and secret ballot, with one deputy from every 150,000 inhabitants.

The RSFSR is a federated state. In it are included 15 autonomous Soviet socialist republics, 6 autonomous regions, and 10 national districts. The Autonomous Soviet Socialist Republics (ASSR), with the dates of their formation, are as follows: Bashkir (March 23, 1919); Buriat-Mongolian (May 30, 1923); Chechen-Ingush (Dec. 5, 1936); Chuvash (April 21, 1925); Crimean (Oct. 18, 1921); Daghestan (Jan. 20, 1921); Kabardo-Balkarian (Dec. 5, 1936); Kalmyk (Oct. 22, 1935); Komi (Dec. 5, 1936); Mari (Dec. 5, 1936); Mordovian (Dec. 20, 1934); North Ossetian (Dec. 5, 1936); Tatar (May 27, 1920); Udmurt (Dec. 28, 1934); Yakut (April 27, 1922). The autonomous regions, with the dates of their formation, are as follows: Adygei (July 27, 1922); Cherkess (April 30, 1928); Jewish (May 7, 1934); Karachai (April 26, 1926); Khakass (Oct. 20, 1930); Oirot (June 1, 1922); Tuva (October 1945). The national districts are: Aginsk Buryat Mongol, Chukot, Evenki, Komi-Permiatsk, Koriak, Nenets, Ostiak-Vogul, Taimyr, Ust Ordin Buriat, Yamalo-Nenets.

All of Central Asia used to be included in the RSFSR, but now forms five Union republics within the USSR, which, together with the years of their separation from the RSFSR, are: Turkmen (1924), Uzbek (1924), Tadzhik (1929), Kazakh (1936), Kirghiz (1936). The Karelo-Finnish SSR (March 31, 1940) and the Moldavian SSR (Aug. 2, 1940) include territories which, prior to the formation of these two Union republics, were part of the RSFSR. The German-Volga ASSR, established within the RSFSR on Dec. 19, 1923, was dissolved on Aug. 28, 1941.

Areas predominantly Russian in population form either large administrative units (*krai*, territory), which may contain autonomous bodies of other nationalities, or smaller administrative units (*oblast*, province or region). As a rule, both *krais* and *oblasts* bear the name of the city where the administrative center is located.

The administrative centers of the six territories (*krais*) are as follows: Barnaul (Altai territory), Krasnodarsk, Krasnoyarsk, Vladivostok (maritime territory), Stavropol, Khabarovsk. The following cities are centers of regions or provinces (*oblasts*): Archangel, Astrakhan, Bryansk, Velikiye Luki, Vladimir, Vologda, Voronezh, Gorky, Grozny, Ivanovo, Irkutsk, Kalinin, Kaluga, Kemerovo, Kirov, Kostroma, Kuibyshev, Kurgan, Kursk, Leningrad, Molotov, Moscow, Murmansk, Novgorod, Novosibirsk, Omsk, Oryol (Orel), Penza, Pskov, Rostov (on the Don), Ryazan, Saratov, Sverdlovsk, Smolensk, Stalingrad, Tambov, Tomsk, Tula, Tyumen, Chelyabinsk, Chita, Chkalov, Ulyanovsk, Yaroslavl.

The population of the RSFSR elects to the Supreme Soviet of the USSR (in accordance with the 1936 Constitution of the USSR) one deputy for every 300,000 inhabitants to the Soviet of the Union, and elects to the Soviet of Nationalities (the second chamber of the Supreme Soviet) 230 deputies—25 as a Union republic, 11 from each autonomous republic, 5 from each autonomous region, and 1 from each national district. (See USSR—*Government.*)

With reference to natural and economic features, the RSFSR may be divided into the following 12 areas: (1) the old industrial center, located around Moscow, in the middle of the European part of the republic, between the Oka and Volga rivers, with the cities of Moscow, Ivanovo, Yaroslavl, Gorky, Tula, Ryazan; (2) the black soil area adjoining the first area from the south and partially bordering on the Ukraine, with the cities Oryol (Orel), Kursk, Tambov, Voronezh, Penza; (3) the western part, located between the Moscow area and Belorussia, with the cities of Kalinin and Smolensk; (4) the northwest of the European part, bordering on the Estonian, Latvian, and Karelo-Finnish SSR's, stretching from the Baltic to the Arctic Ocean, including Leningrad and Murmansk; (5) the northeast of the European part of the RSFSR, between the Moscow area, the Arctic, and the north Urals, including Vologda, Archangel, Kirov; (6) the Volga area, the middle and lower Volga, reaching the Caspian Sea, including Kazan, Saratov, Stalingrad, and Astrakhan; (7) the lower Don and the North Caucasus, bordering in the south on the Caspian, with Rostov-on-the-Don, Novorossisk, Grozny; (8) the Crimea, a peninsula extending into the Black Sea, with Sevastopol and Kerch; (9) the Urals, the area of the mountain range that separates Europe from Asia, with Sverdlovsk, Chelyabinsk, Magnitogorsk; (10) Western Siberia, from the Urals to the Yenisei (Enisei) River, and from the Arctic to the Altai Mountains, with Omsk, Tomsk, Novosibirsk; (11) Eastern Siberia, from the Yenisei to the watershed ranges lying along the Pacific, with Irkutsk, Yakutsk, Chita; (12) the Soviet Far East, the Pacific coast area, from the borders of Korea to the Bering Straits that separate Siberia from Alaska, including Vladivostok, Khabarovsk, Komsomolsk, Petropavlovsk (Kamchatka). (See USSR—*Natural Resources.*)

The population of the RSFSR numbered (according to the census of Jan. 17, 1939) 109,000,000, of which 37,000,000 lived in cities. Since the previous census (Dec. 17, 1926) the population had increased 17 per cent, the urban population increasing 118.4 per cent and the rural declining 5.3 per cent. In the Asiatic part of the RSFSR, including the Urals, the population increased between the two census dates by 33 per cent. In 1926 cities with a population over 100,000 numbered 22; in 1939 they had risen to 55. Whereas in 1926 there were three cities with a population over 250,000, in 1939 there were 19 such cities.

Before the Second World War the RSFSR accounted for approximately 70 per cent of the industrial production of the USSR. In the 1930's industrialization progressed rapidly, particularly in the previously backward areas. From 1917 to 1937 the industrial output of the RSFSR increased 8.4 times, while in many of the autonomous republics there took place a 10 to 15 fold growth. The RSFSR has approximately 90 per cent of all the coal resources of the USSR. A very large share of all machine-building, the chemical industry, lumber and paper industry, production of cement and of the fisheries of the Soviet Union is within the RSFSR. In 1938 the RSFSR had 173,000 collective farms, 2,592 Soviet farms, and 4,324 machine and tractor stations. In its Asiatic part the RSFSR contains the large river systems of the Amur, Lena, Yenisei and Angara, Ob and Irtysh; in Europe the Volga with its tributaries and canal connections.

In World War II the RSFSR was invaded in the north and south. Its second

largest city, Leningrad, was besieged, the Crimea, the rich industrial Donets Basin, and the agricultural Kuban plains were overrun, and the enemy reached as far as Stalingrad on the Volga. But Moscow and a large part of the surrounding industrial area, the lands east of the Volga, the Urals and Siberia, continued production. The vast natural, industrial and manpower resources of the RSFSR, the core of the Soviet Union, made immense contributions toward expelling the enemy from Soviet territory and inflicting a final defeat on Hitlerite Germany.

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RUSSO-JAPANESE WAR. See JAPAN; UNION OF SOVIET SOCIALIST REPUBLICS—*History.*

RUSSO-TURKISH WARS. The many wars fought between Russia and Turkey over a period of several centuries varied widely in their motivation and usually were but parts of much broader international conflicts. The latter was particularly true of the Russo-Turkish conflicts from the last half of the 18th century up to and including the First World War.

The final destruction of the Byzantine Empire by the Turks came with the capture of Constantinople (1453), but this did not have any immediate effect on the foreign policy of the Moscow state. Cultural and commercial ties with the Byzantine Empire had already been interrupted during the "Latin empire" (1204–1261) established by the Crusaders in Constantinople, and the conquest of Russia by the Tatars (first half of the 13th century) contributed to Russia's isolation. Although the Turkish invasion of the Crimea (1475) made its Tatars vassals of Turkey, Crimean designs against the Lithuanian state in the west and other Tatar states on the Volga in the east were even strengthened. Since the latter were also enemies of the young Moscow state, it was to Moscow's interest to establish good relations with the Crimea and the Turkish Empire.

Ivan III (r.1462–1505) sent an embassy to Constantinople (1497) and both he and his son, Vasili III (r.1505–1533) steadily resisted advances made by Western powers and the Vatican to join in an anti-Turkish coalition. Moscow's old enemies, the Tatars of the Golden Horde on the lower Volga were destroyed (1502) by the Crimean Tatars. Thus Moscow succeeded in "destroying one Tatar by means of another." But in the 16th century hostilities with the Crimea developed, and from 1507 on Russia was subjected to repeated Tatar raids from the south. Thus the Russo-Turkish conflict began indirectly through Moscow's clash with the vassals of the sultan.

Under Ivan IV (r.1533–1584) Russia conquered the Kazan Tatars on the upper Volga (1552) and the Astrakhan Tatars on the lower Volga (1556), and penetrated into the Caucasus. Russia's expansion toward the Caspian Sea was regarded by Turkey as a threat to her empire. The Russians were soon forced to withdraw from the approaches to the Caucasus (1571); meanwhile the activities of the Crimean Tatars were hampering Russia's efforts in the Livonian War (1558–1583), fought unsuccessfully by Ivan IV to obtain access to the Baltic Sea.

The long struggle with the Polish-Lithuanian state absorbed much of Moscow's strength; against the Crimea the emphasis was on defensive measures. In 1637 the Don Cossacks captured Azov from the Turks, but Moscow could not support the venture, and the city was abandoned (1642). The Russo-Polish struggle developed also in the Ukraine, which came under Moscow's protectorate in 1654. Here the clash with Crimean and Turkish interests became direct. Moscow now attempted to form a coalition of powers against Turkey, sending missions to England, France and Spain (1667 and 1672) and also trying to interest Vienna, Venice and the Vatican. But Europe was too busy with the wars of Louis XIV of France (q.v.). Russia's war against the Crimea and Turkey (1676–1681) was ended, without gains to Russia, by a 20-year armistice at Bakhchisarai (January 1681). The conclusion of the "eternal peace" with Poland (1686) both freed Russian forces and carried with it a stipulation for joint action with Austria and Poland against the Turks. Although the defeat inflicted on the Turks at Vienna (1683) had relieved the immediate Turkish threat to the west, Russia undertook two military expeditions against the Crimea (1687 and 1689), which ended in complete failure.

Peter the Great's (r.1682–1725) quest for an exit to the sea began with an expedition against Azov (1695), but having no navy the Russians could not take the city. After building a navy in Voronezh, Peter sailed down the Don and took Azov (1696). In 1700 a 30-year armistice was signed with Turkey. Russia kept the city of Azov, but the exit from the Sea of Azov into the Black Sea remained in the hands of the Turks. When, after the defeat at Poltava (1709), Charles XII of Sweden (q.v.) fled to Turkey, there followed a campaign by Peter against the Turks. On the river Prut the Russians were surrounded by superior forces, and Peter sued for peace. The Russians surrendered Azov, and Peter had to abandon the effort to establish Russia as a Black Sea power.

Under Empress Anna (r.1730–1740) Russia again fought Turkey, in alliance with Austria. Russian troops penetrated the Crimea and reached the mouth of the Dnieper (Dnepr). This war (1736–1739) proved expensive in men and money, but was on the whole unsuccessful. Peace was concluded in Belgrade (1739). Russia obtained territories on both banks of the Dnieper, but no access to the Black Sea.

The surge in the direction of the Black Sea continued under Catherine II (r.1762–1796). Catherine's first war against Turkey (1768–1774), who was supported by France, resulted in several victories on land won by Peter Alexandrovich Rumiantsev (1725–1796) and Alexander Vasilyevich Suvorov (1729–1800). The Russian Navy sailed around Europe from the Baltic into the Mediterranean and inflicted a defeat on the Turkish Fleet in the Aegean Sea (1770). By the Peace of Kuchuk-Kainardzhi (Kainardji) (July 1774) Russia received the right to fortify Azov, an exit to the Black Sea through the Kerch Straits was obtained, and all Tatars north of the Black Sea were to be "independent" of Turkey. Russia's border now stretched from the Bug to the Don.

Although Russia had reached the Black Sea, Catherine envisaged further conquests. The so-called "Greek project" of Grigori Alexandrovich Potyomkin (Potëmkin) (1739–1791) captured the imagination of the court, which began to think of expelling the Turks from Europe altogether and of re-establishing the old Byzantine Empire. Catherine's second grandson (b. 1779) was named Constantine, reputedly to be the prospective emperor. In 1783 Russia annexed the Crimea, an act that Turkey could not leave unchallenged. There ensued Catherine's second war against Turkey, the latter receiving England's support. This war (1787–1791) was successful largely because of several brilliant victories by Suvorov. By the Peace of Jassy (1791) Turkey accepted Russia's annexation of the Crimea. Russia began to settle the Black Sea coast, founding Sevastopol (1784) and Odessa (1794).

For a time the struggle against revolutionary France united Russia and Turkey within a coalition of several powers. Russia's Black Sea navy together with the Turkish Fleet operated in the Mediterranean under F. F. Ushakov (1745–1817), who captured the island of Corfu (1798) and collaborated with the Greek independence movement of the day. However, this coalition against France soon broke up. Russia's inclusion of Georgia in the empire (1801) and continued penetration beyond the Caucasus brought about a war with Persia (1805–1813) and Turkey (1806–1812). In this conflict Persia and Turkey had the support of both England and Napoleon (q.v.). On the eve of Napoleon's invasion of Russia, peace was signed in Bucharest (May 1812), with most of Russia's acquisitions in the Transcaucasus acknowledged, and Bessarabia ceded by Turkey to the Russian Empire.

Emperor Nicholas I (r.1825–1855) regarded Turkey as the "sick man of Europe" and favored the partition of that country. Russia was now firmly entrenched on the Black Sea, but the czar's further plans gave rise to the so-called "eastern question," involving most of the European powers. Russia's ambitions in the Near East led Nicholas I, otherwise a staunch opponent of people's movements, to take a favorable interest in the Greek war for liberation (1821–1832). Austria supported the sultan, but England insisted on joint action of the powers on the Greek question. Turkey was forced to recognize (1826) Russia's right to support autonomous principalities in the Balkans, and in 1827 a joint Anglo-French-Russian fleet annihilated the Turko-Egyptian Navy in the Battle of Navarino in the Mediterranean. A new Russo-Turkish war ensued (1828–1829). After initial reverses on the Danube, the Russians took Adrianople and also achieved big successes in the Caucasus. Now Austria began to arm, and pressure was brought on Russia by England and France. The Peace of Adrianople (1829) gave Russia a strong influence in Turkish affairs. Nicholas I continued his penetration into Near Eastern matters, taking advantage of a struggle between Turkey and Egypt, and in 1833 obtained practically a decisive influence in the internal affairs of Turkey. This led to a sharpening of relations with England. In 1840 Turkey was placed under joint protection of European powers. Nicholas' suggestion to England (1844) that Turkey be partitioned was rejected. Although the czar had to retreat, international conflict over the "eastern question" continued. In 1850 there arose a dispute over the rights of the Roman Catholic and Greek Orthodox churches in Jerusalem. This controversy was utilized by the czar, as "protector" of Greek Orthodox interests, for new claims against Turkey. In November 1853 the Russian Black Sea navy under P. S. Nakhimov (1803–1855) destroyed a Turkish squadron in the Bay of Sinope, and France and England joined Turkey in a war against Russia.

The war of 1853–1856, known as the Crimean War, was fought in several theaters. On the Danube, Russian operations against the Turks were not successful, while in the Caucasus the Russians scored considerable gains. A joint Anglo-French-Turkish army landed in the Crimea in September 1854. Russia's Black Sea navy was sunk to block the entrance to the harbor of Sevastopol. In a siege lasting 349 days the grounded Russian sailors and the army stubbornly defended the city, but Sevastopol had to be abandoned by the Russians in September 1855. Although England wanted to continue the war, peace was concluded in Paris early in 1856. Russia's successes in the Caucasus helped soften the peace terms. The Crimea was retained by Russia, but she had to give up territorial gains in the Transcaucasus, lost the right to have a navy in the Black Sea, Turkey's independence was guaranteed by the powers, and access to the Black Sea was made free to all powers.

In 1870 the Franco-Prussian War enabled Russia to abrogate most of the provisions of the Peace of Paris (1856) and to establish herself again as a military power on the Black Sea, with the control of the Straits reverting to Turkey. When a few years later a war of liberation of the Balkan Slavs against Turkey broke out, Russia extended support to the Slavs. The czar encouraged the expressions of public opinion in Russia favoring the "Slav brothers." Again the powers tried to intervene, but in April 1877 Emperor Alexander II (r.1855–1881) declared war on Turkey. The war proceeded both in the Balkans and in Transcaucasia. Turkey received equipment from Europe, and the campaigns proved more difficult than the Russians at first expected. However, by 1878 the Russians were victorious in both theaters and threatened Constantinople. In view of England's war preparations, a preliminary peace was signed in San Stefano (March 1878) on terms favorable to Russia. Under pressure from England and Austria, Russia consented to a revision of this settlement, for which purpose an international congress was called in Berlin (summer of 1878). At Berlin, Russia found herself opposed by all the powers. By the Peace of Berlin, although the Balkan Slavs obtained varying degrees of independence, Russia was stripped of many of her gains and did not obtain control of the Straits, which were left in Turkish hands.

With the rise of imperial Germany, her allies, Austria and Italy, began to play a larger role in Balkan affairs, and Germany's influence grew in Turkey. In World War I Turkey fought against Russia, England and France. The Russian campaign proceeded in the Transcaucasus, with the Russians eventually joining forces with the English advancing from Mesopotamia. The Russian Empire was determined this time to realize its long cherished ambition and again raise the cross on St. Sophia in Constantinople, turned into a mosque by the Turks in the 15th

* Pp. 37–63 omitted. Subject matter under Union of Soviet Socialist Republics.

century. However, czarist Russia came to an end in the revolution of 1917. By the terms of the Treaty of Brest-Litovsk (March 1918) Germany and Turkey penetrated the Caucasus. But their military collapse soon followed, and then came the revolution in Turkey and the establishment of a republic. Peace between Soviet Russia and the Republic of Turkey was concluded in 1921, and with it came one of the earliest Soviet treaties of friendship with another power. Both countries had completely changed internally, and a new set of relationships began to develop.

For bibliography, see UNION OF SOVIET SOCIALIST REPUBLICS—*History*.

RUST, in botany, any of numerous minute parasitic fungi (order of Uredinales) causing spots of discoloration of the tissues in higher plants. They are primitive basidiomycetes, often heteroecious, passing through their life stages on different hosts. The wheat rust *Puccinia graminis* is a well-known example of a rust destructive to grain crops.

RUST, ferric oxide, formed by the gradual oxidation of iron when exposed to the air. Carbon dioxide is, if not a necessary factor, a powerful accelerant of the action. To remove rust the usual mode is to rub the object with a piece of oiled rag or emery paper. More rapid and more satisfactory results are secured by using very pure petroleum, and wiping with a hempen or woolen rag. To prevent rust, dip iron or steel articles in a mixture of equal parts of carbolic acid and olive-oil, rubbing the surface with a rag. Others rub the metal with a mercurial ointment, leaving a thin layer of mercury over the entire surface. If iron be dipped in a solution of carbonate, chromate or bichromate of potash or soda in water the surface will be protected by a tenacious film of oxide against rust for a long time, and objects can be protected for any period by burying in quicklime. Rubbing the surface with plumbago has a similar effect.

RUSTCHUK, roos'chook, Bulgaria, a town on the right bank of the Danube, at the confluence of the Lom, opposite Giurgevo, 42 miles southwest of Bucharest. It has some woolen, silk and other manufactures and considerable trade. It was of strategic importance owing to its position on the old Turkish frontier, and was almost destroyed by the Russian bombardment in the War of 1877–78.

RUSTON, La., city and Lincoln Parish seat; altitude 311 feet; 30 miles west of Monroe, on the Chicago, Rock Island and Pacific; and the Yazoo and Mississippi Valley railroads. There are cotton and dairying interests. The discovery of natural gas near by in 1935 gave impetus to industry. The Louisiana Polytechnic Institute is located here. Ruston was settled in 1884. Pop. (1950) 10,372.

RUTABAGA. See TURNIP.

RUTACEAE, rōō-tā'sē-ē, a widely dispersed family of polypetalous plants with about 950 species, most frequent in warm regions, and especially so in South Africa and Australia. They are generally shrubs or trees, bearing leaves in various forms, without stipules, dotted with glands and often heavy-scented. The four- or five-parted flowers are often in axillary cymes and the fruits are various, being most conspicuous in the genus *Citrus,* which produces the orange and lemon. Two American genera are *Ptelea* (hop-tree), and *Zanthoxylum,* or prickly ash. The latter is represented by small trees, prickly, with a powerfully stimulative and tonic bark. The common rue is a member of the typical genus *Ruta.*

RUTGERS, Henry, American philanthropist: b. New York, Oct. 7, 1745; d. there, Feb. 17, 1830. He was graduated from Columbia in 1766; served as captain in the Revolutionary War and later as colonel of New York militia, and entered the legislature in 1784 to which he was frequently re-elected. He was a member of the board of regents of the New York University from 1802 to 1826. His gifts to public purposes were many, the chief being $5,000 to Queen's College of New Jersey, which thereupon took the name of Rutgers.

RUTGERS SCIENTIFIC SCHOOL, a department of Rutgers University, New Brunswick, N. J., designated by law as the New Jersey State College of Agriculture and Mechanic Arts. See RUTGERS UNIVERSITY.

RUTGERS UNIVERSITY, New Brunswick, N. J., founded as Queen's College Nov. 10, 1766, under a charter granted by George III, was the eighth college to be established in the American colonies. In the charter, which was slightly altered in 1770, the purpose of the college was set forth as "the education of youth in the learned languages, liberal and useful arts and sciences." The college was opened at New Brunswick in 1771, but when the British occupied the city during the Revolution, classes were held temporarily at Millstone and at North Branch. The present site of the college was acquired in 1808. Here the following year was erected Queen's building, a fine example of Georgian Colonial architecture, designed by John McComb. In 1825 the name was changed to Rutgers College in honor of Col. Henry Rutgers, (q.v.) whose benefactions aided the struggling young college. In 1864 the Rutgers Scientific School was designated by the State Legislature as the New Jersey College for the benefit of Agriculture and the Mechanic Arts, to be maintained by the Board of Trustees under contract with the State. The pioneering work in agricultural science that soon followed at the college farm, resulted in the founding in 1880 of the New Jersey Agricultural Experiment Station, the third American experiment station to be established by State legislation. With the gradual expansion of State services in technical education and research, the Legislature in 1917 designated the college as the State University of New Jersey. The New Brunswick Theological Seminary, of the Reformed Church of America, originally was affiliated with the college, but in 1856 it became a separate institution. The name Rutgers University was adopted in 1924. The university now comprises the following divisions: College of Arts and Sciences (1766), College of Engineering (1864), College of Agriculture (1864), Department of Ceramics

(1902), New Jersey College for Women (1918), School of Education (1923), University Extension Division (1925), New Jersey College of Pharmacy, at Newark (1927), School of Chemistry (1930), University College (1934). Undergraduate and graduate curricula lead to the following degrees: Bachelor of Arts, Bachelor of Letters, Bachelor of Science, Bachelor of Business Administration, Civil Engineer, Electrical Engineer, Mechanical Engineer, Master of Arts, Master of Science, Master of Education, Master of Library Science, Doctor of Education, and Doctor of Philosophy. Rutgers is the only land-grant college that has a colonial charter. There is a staff of 880 full-time faculty members. Undergraduate students number 5,401, graduate students 374, and the total enrollment is 16,319, including part-time and summer students. Rutgers is a coeducational university. Among the noteworthy collections to be found in the university's library are sets of scientific works, and materials relating to the government and history of New Jersey.

CARL R. WOODWARD,
Secretary.

RUTH, George Herman (Babe), American baseball player: b. Baltimore, Md., Feb. 6, 1895; d. New York City, Aug. 16, 1948. He learned to play baseball at St. Mary's Industrial School, a Catholic institution in Baltimore to which his parents sent him when he was 7 years of age. He began his professional career in 1914 as a left-handed pitcher on the Baltimore Baseball Club, and before the close of the season was sold to the Boston American League team, with which he developed into one of the best left-handed pitchers of all time. However, he demonstrated such remarkable hitting ability that he frequently was played at first base or in the outfield. In 1919 he hit 29 home runs, regarded then as a remarkable feat. On Jan. 3, 1920, he was sold to the New York American League team (the Yankees) for $100,000, plus a personal loan to the owner of the Boston team of $370,000.

During his 15 years with the Yankees, Ruth developed into the greatest attraction the game of baseball has ever known, and by long odds the highest salaried player of his day. He was the idol of the fans, and the hero of the younger generation—a popularity that never deserted him. He remained with the Yankees until the end of the 1934 season, then signed with the Boston National League team for 1935, but did not play out the season.

In 22 years of major league play, he set or tied 76 records. He hit a total of 714 home runs (60 in one year, 1927), drew 2,056 bases on balls, and struck out 1,330 times. His pay for playing in 1930 and 1931 was $80,000 for each year. He was so much of an attraction that the $2,000,000 Yankee Stadium is still called the House That Ruth Built. He played in 10 World Series, and set a number of records for series play. These include hitting three home runs in one game, which he did twice, 1926 and 1928; highest series batting average, .625, 1928; most total runs, 37 in 10 series, 41 games; and pitching 29⅔ consecutive scoreless innings: Oct. 9, 1916, Boston American League, 13⅓ innings; Sept. 5, 1918, 9 innings; Sept. 9, 1918, 7⅓ innings.

He was a born showman. Everything he did was done with gusto. He was as impressive when he struck out as he was when he hit a home run. After his death his body lay in state in the Yankee Stadium before burial so that his thousands of admirers might have an opportunity to pay him a last tribute, and 77,000 persons filed past him there, many of them in tears.

A few years before his death he established the Babe Ruth Foundation for underprivileged children, and bequeathed to it a considerable part of his estate.

RUTH. A Moabitess, whose story is given in the 8th book of the Old Testament; daughter-in-law of Naomi, and wife, first of Mahlon, and then of Boaz. She is especially remembered for the disinterested love which displayed itself in her resolute refusal to forsake her mother-in-law in the latter's distress. The words (Ruth 1:16-17) "Entreat me not to leave thee, . . ." are among the most beautiful in all literature.

RUTH, Book of. Old Testament book so named after the chief character in the narrative. A famine compelled Elimelech, and Ephrathite of Bethlehem-Judah, to take his wife Naomi and their two sons to the country of Moab, where one of the sons married Ruth, a Moabitess. When Naomi, after losing her husband and her two sons, returned to her own land, Ruth, her daughter-in-law insisted on going with her. Here a Hebrew named Boaz, accepting the duty of the next-of-kin, married her, and she became the great grandmother of David. The action is placed in the period of the Judges, and most of the narrative is written in a pure and early style of Hebrew, but the Book seems at least to have been edited at a later date (note the late words in 1:13 and 4:7, 18:22. The purpose of the story may have been either to emphasize the duty of the next-of-kin to marry a childless widow, or to justify the legitimacy of intermarriage with foreigners.

RUTHENES, RUTHENIANS, RUSSNIAKS, or **LITTLE RUSSIANS,** are Slavonic tribes inhabiting, prior to World War II, countries bordering Soviet Russia. They are part of the "Little Russians" who dwell in the Ukraine. The number of Austrian Ruthenes amounted to about 3,500,000; according to some authorities there were over 4,000,000, of whom 500,000 were settled in the northeast provinces of Hungary, 300,000 in the northwest of Bukowina, and the remainder in Galicia. The name "Ruthene" is merely the German and Austro-Hungarian title for "Ukrainian"; by whatever name they are called, they are one people, and form a racially compact mass of some 30,000,000 souls, extending from the Dnieper to the Carpathians into Hungary. Russia regards the Little Russians as an integral part of the Great Russian family and their language as a Russian dialect. Austria, on the other hand, encouraged the Ruthenes to regard themselves as a separate Slav race and their language as a distinct Slav idiom. As Rambaud has pointed out, some writers have been anxious to establish the existence of a profound difference between the Great Russians and their two neighbors, the White and the Little Russians. The dialectical differences between the idioms of these three families are easily traceable to historical and literary influences. The Little Russian dialect is spoken by over 26 per cent of Russian-speaking races.

The Carpathian Ruthenes are divided into Boiki, Lemki, Gutsuli and Ugorski Ruthenes. Of these the Boiki inhabit the central portion of the northeastern slope of the Carpathians. They wear long hair and are sometimes clean-shaven—in marked contrast to the Slavs of Russia proper. Their chief occupation is cattle-breeding. The Lemki live between the northern frontier of the Boiki as far as the River Poprad. They are much under the influence of the Slovaks and their dress differs considerably from that of the other Ruthene tribes. Their hair is cropped short and their faces are always clean-shaven. The Gutsuli inhabit the southwestern region of Eastern Galicia, West Bucovina, and southeastern Ugorsakya Rus, forming in reality a single people divided into three by political boundaries. Dwelling in remote mountain districts they alone among the Austro-Hungarian Ruthenes escaped serfdom and developed among themselves a comparatively high degree of well-being. Their manner of life has fostered among them the love of arms and a fondness for finery in dress. To a greater degree the Gutsuli have preserved their ancient heritage in dress and habits than other Ruthene tribes. The Ruthenes of the Galician plain reproduce in their dress and buildings the more typical features of life in the neighboring Volhynia and Podolia provinces of Russia, whereas in Bucovina the obtrusion of Rumanian influence is marked. The Ruthenian peasants of Eastern Galicia lived in wretched circumstances; they were mere farmhands tied to the soil by a miserable pittance from the landed gentry, who owned much of the land and held practically all administrative posts. The bulk of the Ruthenes belong to the Uniate Church, which means that they acknowledge the Pope, but retain the outward forms of the Greek Church and have married priests. Despite the published official statistics, it was the Ruthenes and not the Poles who are in the majority within Galicia. Under the franchise law of 1907 the Poles obtained 78 seats in the new Parliament, while the Ruthenes were given 28 seats. By a compromise effected in February 1914 the Ruthenes were guaranteed a representation of 27 per cent in the legislature. Yet the Ruthenes were in many respects better off under Austrian than Russian rule. They were permitted their own schools (about 2,500), social and political clubs and their own language and literature. The University of Lemberg, established by Emperor Joseph II for the Ruthenians alone, was appropriated by the Poles. Directly following the end of World War I the Ruthenian section of Galicia was joined to the short-lived Ukrainian Republic. In the division of territory which resulted from the various peace treaties the territory occupied by the Ruthenians was divided among the Succession States. Carpatho-Ukraine became a province of Czechoslovakia, Bucovina was awarded to Rumania, and Eastern Galicia became part of Poland, until Poland's partition in 1939 brought it into the Russian fold. In June 1945 Czechoslovakia yielded her Carpatho-Ukraine province to Russia. Then the World War II peace treaty with Rumania transferred Bucovina to Russia, thus completing the integration of Ruthenian populations in the Soviet Ukrainian Republic. See UKRAINE; CZECHOSLOVAKIA; RUMANIA.

RUTHENIUM, a metal of the platinum group. It has the atomic weight 101.7, and the symbol Ru. Some specimens of platinum ore contain from 3 to 6 per cent of ruthenium. It is a whitish-gray metal, having a specific gravity of 11 to 11.4 and after fusion of 12.063; is very fusible, more so than any other metal except osmium; is scarcely attacked by nitromuriatic acid, but is more easily oxidized by fusion with nitre, chlorate of potassium, etc. than platinum. Ruthenium forms a series of salts which are analogous to those of platinum.

RUTHERFORD, rŭth'êr-fêrd, **Ernest,** 1ST BARON, British physicist: b. Nelson, New Zealand, Aug. 30, 1871; d. London, Oct. 19, 1937. He was educated at the University of New Zealand and at Trinity College, Cambridge, England. From 1898 to 1919, he was professor of physics at McGill University, Montreal, and at Manchester University, England. He later became Cavendish professor of experimental physics and a fellow of Trinity College, Cambridge. In 1908, he received the Nobel Prize for chemistry. He identified the three principal types of radioactive emanations, the work resulting in his theory of radioactive disintegration. It also led to his ideas of nuclear and atomic structure, generally known as the Bohr-Rutherford theory. In 1919, he showed that high-energy alpha-particles could be used to produce disintegration of nitrogen nuclei, discovering the first of those transmutations which became numerous in later nuclear physics. He wrote *Radioactivity* (1904); *Radiations from Radioactive Substances* (with James Chadwick and C. D. Ellis, 1930). A biography of him was written by A. S. Eve, entitled *Rutherford* (1939).

RUTHERFORD, borough, N. J., in Bergen County, altitude 100 feet, on the Erie Railroad, 9 miles from downtown New York. It is a residential town. Cultural interests include a Little Theater guild and a choral society. The town was named for John Rutherford, patriot and friend of George Washington. Pop. (1940) 15,466; (1950) 17,411.

RUTHERFURD, Lewis Morris, American astronomer: b. Morrisania, N. Y., Nov. 25, 1816; d. Tranquility, N. J., May 30, 1892. He was graduated from Williams College in 1834, admitted to the bar in 1837, and practiced law in New York until 1849. He then devoted himself to the study of science, making valuable investigations in the departments of astronomical photography and spectral analysis. He made several instruments for use in his laboratory, among which were an object glass, a micrometer for measuring astronomical photographs and a dividing engine (q.v.) of great value. He was a trustee of Columbia College from 1858 to 1884, when he resigned and presented his astronomical instruments to that institution.

RUTHVEN, Raid of. See GOWRIE CONSPIRACY.

RUTILE, titanium oxide TiO_2 in tetragonal form, the chief source of titanium; also used as a gem and for coloring matter for porcelain and artificial teeth. There are deposits in Virginia.

RUTLAND, town, Massachusetts, Worcester County; altitude 1,250 feet; 12 miles north of

Worcester. Because of its high altitude, several tuberculosis sanatoriums are located here, providing a market for local dairy and poultry products. Rutland was settled in 1716, and became a town in 1722. After the surrender at Saratoga, part of Burgoyne's troops were quartered here in 1777–1778. Pop. (1940) 2,181; (1950) 3,056.

RUTLAND, city, Vermont, Rutland County seat; altitude 560 feet; on Otter Creek, the longest river in the state; on the Rutland Railroad; and with freight service over the Delaware and Hudson Railroad; by rail, 67 miles south of Burlington; with an airport six miles distant. Surrounding Rutland is a fertile farming region, and the city is the trading center for a considerable group of smaller towns. In the county the quarrying, cutting, and finishing of marble is a leading industry; in the city are railroad shops, and establishments manufacturing scales, boilers, maple sugar equipment, dresses and underwear. Rutland, however, is best known as the Marble City, and the building of the railroad opened the way for development of a merely local industry into one commanding the national market. It is Vermont's second largest city, and is widely known as a winter sports center.

Rutland has a number of old buildings, some dating back to pre-Revolutionary times, and many fine modern structures. The first actual settler was James Mead, who in 1770 built a log house near the Center Rutland Falls, now locally known as Mead's Falls. In 1784, seven years before Vermont became a state of the Union, Rutland was made county seat. From 1784 to 1804 it was the scene of a number of meetings of the legislature. In 1886 the township was partitioned, two new townships, Proctor and West Rutland, being created. The present city of Rutland was organized in 1892. It has a mayor and council. Pop. (1950) 17,647.

RUTLEDGE, Ann. See LINCOLN, ABRAHAM.

RUTLEDGE, rŭt'lĭj, **Edward,** American soldier and legislator: b. Charleston, S. C., Nov. 23, 1749; d. there, Jan. 23, 1800. He was admitted to the bar in 1773, established a practice in Charleston and in 1774 was elected to the Continental Congress. He was a signer of the Declaration of Independence in 1776 and a member of the first board of war. In this capacity he was delegated with John Adams and Benjamin Franklin to confer with Lord Howe on the subject of a reconciliation, but declined to treat with him excepting on the basis of American independence. As lieutenant colonel of the Charleston artillery he assisted in expelling the British from Port Royal in 1779 and in 1780 was captured. After his release a year later he resided in Philadelphia, and was a member of the Jacksonborough legislature in 1782.

RUTLEDGE, John, American jurist: brother of Edward Rutledge (q.v.); b. Charleston, S. C., 1739; d. there, July 18, 1800. He studied law in England, returned to Charleston in 1761 and there established himself in law practice. From the outset of his career he was an ardent opponent of the oppressive laws governing the colonies and as delegate to the congress at New York in 1765 openly advocated the united resistance of the colonies. In 1774 he was a member of the South Carolina convention which carried a resolution that South Carolina should be represented in the Continental Congress. He served as delegate to the Congress of 1775 and in 1776 was chairman of the committee that framed the South Carolina constitution, was elected president of the state government and commander in chief of the militia. When the British forces arrived off Cape Fear he fortified Charleston and prevented the invasion of the state. He resigned his office in 1778 through dissatisfaction with changes in the constitution, but was recalled in the following year and invested with dictatorial authority. He at once set about preparations for defense and held the city until 1780. He then joined the forces of General Greene and upon the recapture of Charleston resumed his duties as governor. In 1782 he was elected to the Continental Congress, was re-elected in 1783 and in 1784 became chancellor of South Carolina. He was a member of the convention which framed the Constitution of the United States in 1787. He became chief justice of his state in 1791 and in 1795 was appointed chief justice of the Supreme Court.

RUTLEDGE, Wiley Blount, Jr., American jurist: b. Cloverport, Ky., July 20, 1894; d. York, Me., Sept. 10, 1949. Nominated to the United States Supreme Court by the late Franklin D. Roosevelt on Jan. 11, 1943, Associate Justice Rutledge, an earnest defender of civil liberties, was considered a member of the court's "liberal bloc," made up of Justices Hugo L. Black, William O. Douglas, and the late Frank Murphy.

The son of a Baptist preacher, he attended Maryville College in Tennessee and was later graduated as a bachelor of arts from the University of Wisconsin in 1914. After a year of teaching commercial subjects at Bloomington (Ind.) High School and of studying law at the same time, he accepted a full time teaching position at Connersville, Ind., where he contracted tuberculosis. In 1917 he went west to Albuquerque, N. Mex., took a position there as secretary to the city's school board, recovered his health, and then returned to his law studies, receiving his bachelor of laws degree from the University of Colorado in 1922.

After practicing law in Boulder, Col., from 1922 to 1924, Rutledge resumed his teaching career, specializing in the study of law. He was associate professor of law at the University of Colorado, 1924–1926; professor of law at Washington University, 1926–1935, acting dean, 1930–1931, and dean of the School of Law, 1931–1935; and professor of law and dean of the College of Law, State University of Iowa, 1935–1939.

In 1939, President Roosevelt appointed Rutledge an associate justice of the United States Court of Appeals for the District of Columbia. On Feb. 15, 1943, Rutledge was sworn in as an associate justice of the United States Supreme Court, succeeding James F. Byrnes, who had resigned to become director of the Economic Stabilization Board.

RUWENZORI, roo-wĕn-zō'rē, a group of mountains in Africa, north of the equator, discovered by Stanley in 1888, in his great journey from the west to the east coast, when he rescued Emin Pasha. It is a chain of heights about 16,000 feet in elevation, is clad with snow and

traversed by large glaciers. It lies about 200 miles west of Lake Victoria and between Lake Albert and Lake Albert Edward. The river Semliki, connecting the latter two lakes, flows in a valley near the range. The snow line is about 13,000 feet above sea level. These mountains are sometimes identified with the Mountains of the Moon, spoken of by ancient writers.

RUY BLAS, rōō-ē'bläs, a drama in five acts and in verse, by Victor Hugo. It is considered one of the best of his plays, and is popular also in the adaptation *Don César de Bazan.* In *Ruy Blas,* Hugo's dramatic theory of contrast of grave and gay, rapid alternation of tragic and grotesque, is pushed to its utmost. The scene is Madrid; the time 1699. Don Salluste de Bazan, scorned by Maria de Neubourg, second wife of the king, Charles II, plots revenge. Failing to enlist the aid of his scapegrace but chivalrous cousin, Don César, he introduces his own valet, Ruy Blas, to the court as his kinsman. Ruy Blas is in love with the queen and through her sympathetic interest gains official preferment which he uses for political and fiscal reform. The long speech, 101 lines, in which he contrasts the sordid struggle for sinecures in a decaying monarchy with the glories of the reign of Charles V, ranks among the most brilliant tirades of the French drama. The queen and Ruy Blas are betrayed into a compromising situation by Don Salluste, who, when Don César threatens to balk his revenge, ruthlessly sacrifices his cousin to his injured vanity. Ruy Blas kills Don Salluste and then himself, consoled that his death has won from the queen an admission that love has overcome all prejudice of rank or station.

This play, which Hugo says he began to write on July 4, 1838, has, except for the denouement, constant and perplexing likeness to Sir Edward Bulwer-Lytton's *Lady of Lyons,* first acted Feb. 14, 1838. The idea of a valet set by a scorned lover to woo a fine lady had been turned to dramatic account in Molière's *Les Précieuses ridicules.* Hugo certainly used Henri de Latouche's *La Reine d'Espagne* (1831). In his very inaccurate *V. Hugo raconté par un temoin de sa vie,* Auguste Vacquerie notes as sources the *Memoires d'Espagne* of Madame d'Aulnoy (1690), *Solo Madrid es corte* (1675), and Vayrac's *État présent d'Espagne* (1718). How carelessly Hugo used all these is shown in detail by Alfred Morel-Fatio in his *Etudes sur l'Espagne,* vol. 1, pp. 177-244 (1888–1904).

BENJAMIN W. WELLS.

RUYSBROECK, rois'brōōk, or **RUISBROECK,** rois'brōōk, or **RUSBROEK,** rûs'brōōk, **Jan van,** Flemish mystic: b. Ruysbroeck, Flanders, 1293; d. Groenendael, Dec. 2, 1381. He was educated at Brussels for the priesthood, was ordained in 1317, and for 26 years served as a secular priest of the church of St. Gudule in Brussels. In 1343 he withdrew to the hermitage of Groenendael in the forest of Soignies. In 1349 the hermitage became an Augustinian monastery of which Ruysbroeck was prior. Here he lived a contemplative life and wrote his mystical works, the chief of which are *The Adornment of the Spiritual Marriage, The Seven Steps of the Ladder of Spiritual Love, The Mirror of Blessedness, Book of Supreme Truth.* They were written in Flemish and translations were made into Latin, German, French, Dutch, and English. A complete edition of Ruysbroeck's works was published in Bussum, Holland, in 1912.

Consult Engelhardt, M., *Richard von St. Victor und Joannes Rusbroek* (Erlangen 1838); Ullmann, K., *Reformatoren vor der Reformation* (Hamburg 1842).

RUYSBROECK, William of. See RUBRUQUIS.

RUYSDAEL, Jacob van. See RUISDAEL.

RUYTER, roi'tĕr, **Michael Adriaanzoon de,** Dutch admiral: b. Flushing, Netherlands, March 24, 1607; d. Syracuse, Italy, April 29, 1676. He early entered the navy and rose from cabin boy to captain by 1635. In 1641 he was placed as rear admiral in command of a fleet sent to the assistance of the Portuguese, who had thrown off the yoke of Spain, and he was afterward employed against the Barbary corsairs. In the war between the Dutch and English, begun in 1652, Ruyter repeatedly distinguished himself, especially in the battle fought in February 1653 near the mouth of the English Channel. In this battle Admiral Richard Blake, commanding the English, defeated Ruyter and Admiral Maarten Tromp, who commanded the Dutch.

Ruyter became vice admiral of Holland after the death of Tromp in 1653, and afterward served against the Portuguese, the Swedes, and the Turkish states of North Africa. He commanded in the great battle fought off Dunkirk in June 1666, against the English under Prince Rupert and the duke of Albemarle, in which neither side gained the victory; but in July Ruyter was defeated, and returned to Holland. In the following year he made his memorable expedition up the Thames, when he destroyed Upnor Castle and burned some ships at Sheerness. He was made admiral in chief of the Dutch fleet and commanded at the battle of Sole Bay (Southwold Bay) in 1672, against the English and French fleets under the duke of York, the earl of Sandwich, and Count d'Estrées. The Dutch were defeated, but in the following year Ruyter defeated Prince Rupert and d'Estrées off Schooneveldt. Peace was made with England, though the war with France continued. In a battle with the French fleet in the Mediterranean in April 1676, Ruyter was seriously wounded in the right leg and died a week later. His body was returned to Amsterdam for burial in the New Church there.

RUZICKA, rōō'zhĕch-kä, **Leopold,** Swiss chemist: b. Vukovar, Yugoslavia, Sept. 13, 1887. He was educated at the Technical High School in Karlsruhe, Germany, and at the University of Basel in Switzerland. In 1926 he became professor of organic chemistry at the University of Utrecht, and in 1929 professor of chemistry at the Technical High School in Zurich. His research in the chemical structure of sterols led to the discovery that the male hormones, androsterone and testosterone, could be synthetically produced from a neutral sterol such as cholesterol. In 1939 he shared the Nobel prize for chemistry with Adolph Butenandt.

RUZSKY, or **RUSSKI, Nikolai Vladimirovich,** Russian general: b. about 1854; d. 1918. He was educated at Constantine military schools

and at the Nicolas General Staff Academy, served in the Turkish War of 1877–1878, and in the Russo-Japanese War was quartermaster general. At the outbreak of World War I, Ruzsky was in command of the Russians Northern Army and conducted the brilliant military operations which led to the capture of Lemberg in September 1914, a feat for which he received honors from both England and France. He was retired because of ill health in April 1915, but resumed his command in September. He was again relieved of his command in December 1915, although he retained his position in the council of the empire and the supreme military council. He was again in command of the Northern Army in July 1916-May 1917, and was then relieved to be reinstated by Kerensky Sept. 14, 1917, as commander in chief of the Northern Army. He retired on the establishment of the Soviet Government, and was killed by the Bolshevists in 1918.

RYAN, Abram Joseph, American Roman Catholic clergyman, and poet of the Confederacy; b. Hagerstown, Md., Feb. 5, 1838; d. Louisville, Ky., April 22, 1886. He was educated for the priesthood at Niagara University, Niagara Falls, N. Y., teaching there and at the diocesan seminary at Cape Girardeau, Mo., until Sept. 1, 1862, when he joined the Confederate service as a chaplain. A deeply spiritual person, he ministered to the dying on the battlefield, and helped carry the wounded to safety until, in his own words, "The Conquered Banner was furled at Appomattox." Of his numerous poems, many of exquisite beauty, perhaps the best known are *The Conquered Banner,* written after the end of the Civil War, and *The Sword of Robert E. Lee.* Others include *The Lost Cause, Gather the Sacred Dust,* and *March of the Deathless Dead.* It was these verses that earned him the title Poet of the Confederacy. An unreconstructed rebel, Father Ryan never relented in his attitude toward the North until it joined in relief work during the cholera plague in the South in 1878. Then he wrote the poem *Reunited.* His collected poems were published in 1879 under the title *Father Ryan's Poems;* and this was followed by the book of devotions *A Crown for Our Queen* (1882).

RYAN, Edward George, Irish-American lawyer and state judge: b. Newcastle House, near Enfield, County Meath, Ireland, Nov. 13, 1810; d. Madison, Wis., Oct. 19, 1880. Emigrating to New York in 1830, he studied law and was admitted to the bar in 1836. The same year he moved to Chicago where he became editor of the *Tribune* in 1839 and was for a time prosecuting attorney for Cook County. In 1842 he moved to Racine, Wis., and six years later to Milwaukee, after having served in 1846 as a delegate to the convention that framed Wisconsin's state constitution. There he achieved distinction as a trial lawyer, especially in criminal cases. Appointed chief justice of the state's supreme court in 1874, the following year he was elected to the same office. A states' rights Democrat, he nevertheless remained inflexibly loyal to the national government during the Civil War.

RYAN, John Augustine, American sociologist and theologian: b. Vermillion, Minn., May 25, 1869; d. Saint Paul, Minn., Sept. 16, 1945. He received his education in the public schools, the College of St. Thomas, the Saint Paul Seminary, and the Catholic University of America. After ordination to the priesthood by Archbishop John Ireland on June 4, 1898, he served for a time in a rural parish and then went to the Catholic University of America for higher studies in theology and canon law, receiving the S.T.D. degree in 1906. From 1902 to 1915 he taught moral theology in the Saint Paul Seminary and from 1915 to 1939 at the Catholic University of America. After retirement from teaching, he continued his work as writer, lecturer, and official of the National Catholic Welfare Conference in Washington.

Dr. Ryan's field of activity may be described as that of social justice. His first book, a revision of his doctoral dissertation, was *A Living Wage* (1906), a pioneer work that made a deep impression both in America and abroad, and resulted in widespread legislation, some of which Dr. Ryan himself wrote, based on its principles. Among his other books are *Francisco Ferrer, Criminal Conspirator* (1910); *Socialism—Promise or Menace?* (1914; new ed. 1941), a debate with Morris Hillquit; *Distributive Justice* (1916); *Social Reconstruction* (1920); *The State and the Church* (1922), new ed. with Francis J. Boland called *Catholic Principles of Politics* (1940); *Declining Liberty and Other Papers* (1927); *The Catholic Church and the Citizen* (1928); *Questions of the Day* (1931); *A Better Economic Order* (1935); *Seven Troubled Years* (1937); and *The Norm of Morality* (1944). Dr. Ryan received many honors, among them his appointment by Pope Pius XI in 1933 as a domestic prelate with the title of Right Reverend Monsignor; an honorary doctorate from Columbia University; choice by President Franklin D. Roosevelt to give the invocation at his second inaugural; and membership in the three-man Industrial Appeals Board of the National Recovery Administration.

Monsignor Ryan was the outstanding American Catholic sociologist, and the impact of his thought is to be found in various types of social and economic legislation, the labor movement, work for international peace and understanding, racial relations, and education, especially higher studies among the Catholic clergy and laity. Certain of his views were opposed as ultraliberal and even radical, but such opposition was gradually nullified by their wide acceptance and practical success. His work is marked by depth and originality of thought, clear and vigorous expression, and command of both basic principles and factual material; his personal character by integrity and simplicity, charm of manner, deep religious belief, and a corresponding practice. Consult his autobiography *Social Justice in Action* (1941).

JOHN K. RYAN,
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RYAN, John Dennis, American capitalist and copper miner: b. Hancock, Mich., Oct. 10, 1864; d. New York, N. Y., Feb. 11, 1933. Son of a mining expert and prospector in the Lake Superior copper district, he succeeded H. H. Rogers as president of the Amalgamated Copper Company in 1909, which soon became the Anaconda Copper Mining Company. He also organized the Montana Power Company. In May 1918, he became director of the Bureau of Aircraft Production, and three months later was assistant secretary of war and chairman of the Air-

craft Board. Despite his efforts, not one American built fighting plane reached the front in World War I. He resigned Nov. 21, 1918, to become chairman of the Anaconda's board of directors.

RYAN, Patrick John, American Roman Catholic prelate: b. Thurles, Ireland, Feb. 20, 1831; d. Philadelphia, Pa., Feb. 11, 1911. After receiving a deaconship at St. Patrick's College, in Carlow, Ireland, he emigrated to the United States and was ordained to the priesthood at St. Louis, Mo., in 1853. Appointed curate of the cathedral there, he subsequently was appointed rector of the Church of St. John the Evangelist and vicar general of the St. Louis diocese. In 1868, he accompanied Archbishop Kenrick to Rome, and in 1872 was consecrated titular bishop of Tricomia and coadjutor to Archbishop Kenrick. In 1884 he became titular archbishop of Salamis and was transferred to the metropolitan see of Philadelphia. He delivered discourses in nearly all the larger American cities, notable among these lectures being that on "Modern Skepticism." He published *What Catholics Do Not Believe,* and *The Causes of Modern Religious Skepticism.*

RYAN, Thomas Fortune, American capitalist: b. Nelson County, Va., Oct. 17, 1851; d. New York, N. Y., Nov. 23, 1928; engaged in drygoods business at Baltimore in 1868, but in 1872 went to New York and entered Wall Street, becoming a member of the stock exchange in 1874, when but 23 years old. He was connected with the consolidation of the street railways and lighting systems of New York, Chicago, and other cities; was interested in railroad and coal properties in Ohio and West Virginia. In 1905 he purchased a controlling interest in the Equitable Life Assurance Society. On his retirement in 1910 he was officer or director in more than 30 corporations. A supporter of the Democratic Party and liberal contributor to campaign funds, he served as a delegate to National Democratic conventions.

RYAZAN, rye-zän'y. See RIAZAN.

RYBINSK, city. See SHCHERBAKOV.

RYDAL, England, a picturesque village in the county of Westmoreland, two miles northwest of Ambleside. It is situated in a narrow gorge formed by the projection of two mountains near Rydal Lake. The lake, only half a mile in area, contains two beautiful islets, is encircled by meadows and dominated by rocky heights which add to the charm and calm beauty of the surroundings, so celebrated in English literature. Rydal Hall is a fine mansion in a park which contains many grand forest trees and a cascade immortalized in verse by Wordsworth, who lived for some years at Town End, nearby, as did De Quincey.

RYDBERG, rüd'bär-y, **Abraham Viktor,** Swedish writer: b. Jönköping, Dec. 18, 1828; d. Stockholm, Sept. 21, 1895. He studied at the University of Lund, and in 1854 entered journalism, contributing to the leading paper of Göteborg. In 1868 he was sent to an assembly of the church where he was the champion of liberal ideas and from 1870 to 1872 sat in the Riksdag. In 1884 he became professor of the history of civilization at Stockholm. He is the author of *The Pirate of the Baltic* (1857); *The Last of the Athenians* (1859), which has been translated into English, German and Danish; *The Teachings of the Bible about Christ* (1862); *Magic of the Middle Ages* (1864); and *Romish Legends of the Apostles Peter and Paul* (1871). His works include all studies in esthetics, philosophy, and psychology, besides poetry and a translation of Goethe's *Faust.* He is regarded as one of the foremost Swedish men of letters.

RYDE, rīd, England, municipal borough and watering place on the northeast coast of the Isle of Wight, overlooking the Spithead. Beautifully situated, it has developed from a small fishing village, at the end of the 18th century, into a popular resort. It has steamer connection with Portsmouth, 5 miles away, and other mainland ports. Pop. (1946 est.) 19,080.

RYDER, Albert Pinkham, American artist: b. New Bedford, Mass., Mar. 19, 1847; d. Elmhurst, N. Y., Mar. 28, 1917. After studying under the engraver, William E. Marshall, and at the National Academy of Design, he contributed to the academy's annual exhibitions, and from 1878 to 1887 to those of the Society of American Artists. He became an academician in 1906, but little attention was paid to his early work. Living alone (he never married) in an attic studio in New York, he lived wholly for his art, yet was no misanthrope, having many friends among fellow-artists and connoisseurs. He had the traditional improvidence and unworldliness of genius, giving away on impulse many of his finest paintings. His landscapes, in the imaginative idealistic tradition of the Hudson River school, are poetic creations of extraordinary charm, and earned him the title of "last of the romanticists." But he is most admired for his marines. He also painted an occasional still life, and symbolic pictures. Among his patrons was a group of Canadian connoisseurs, including Sir William Van Horne. His work is in the permanent collections of leading American and Canadian museums. Among the best known examples are *Temple of the Mind, The Flying Dutchman, Jonah and the Whale, The Curfew Hour, Death on a Pale Horse,* or *The Race Track,* and *Macbeth and the Witches.* See AMERICAN ART.

RYDQVIST, rĭd'qwĭst, **Johan Erik,** Swedish critic and philologist: b. Göteborg, Oct. 20, 1800; d. Stockholm, Dec. 17, 1877. After studying law and ancient languages at Uppsala from 1820 to 1826, he was appointed to the staff of the Royal Library at Stockholm, becoming chief librarian in 1843, retiring in 1865. He was elected a member of the Swedish Academy (1848) and of the Royal Academy of Sciences (1856). He translated many Greek and English works into Swedish and published numerous literary and critical essays, notably in *Heimdall,* a critical review which he edited from 1828 to 1832. His principal works include *The Chief Literary Events of Past Ages* (1828); *Ancient Nordic Drama* (1836); and *Laws of the Swedish Language* (1850–1874), an authoritative philological work.

RYE, N. Y., a city of Westchester County, on the New York, New Haven and Hartford Railroad, eight miles northeast of New Ro-

chelle. Rye was founded in 1660, and five years later was organized as a town of Connecticut, the border line not being settled until 1700. It became a city in 1942. One of Rye's interesting features is the Jay homestead. Rye Beach on Long Island Sound, with its picturesque colony of bungalows, cottages and shacks, is a favorite summer resort for bathing, boating and other recreations. Pop. (1940) 9,865; (1950) 11,721.

RYE (*Secale cereale*), a plant of the grass family, and allied to wheat, yielding one of the most important cereal crops in the United States. It is an erect hardy annual, with slender stiff culms from four to six feet high, flat leaves, and a terminal, compact, somewhat flattened, bearded spike from four to six inches long. The spikelets are usually two-flowered, sessile, compressed, alternate, convex on one side and flat on that next the rachis. The outer glume is keeled and often carries a short awn, while the flowering glume carries a long awn. Each floret has three stamens and two very short styles. The grain is oblong, furrowed on the inside, hairy at the apex and generally free from the flowering glume and palea. The plant is not found wild, but is believed to be indigenous to the country bordering the Black and the Caspian seas. The granules of rye-starch are larger than those of wheat or barley, some being .0016 of an inch in diameter. The form of the larger ones is that of a flattened disc with a depressed center having cracks on its outer edge. The hilum is central with lines radiating almost to the circumference.

Soviet Russia continues the chief rye producing country, although since World War II much rye acreage has been shifted to wheat. Production in the United States has declined for several years, that of 1951 amounting to 21.4 million bushels; in the same year Canada harvested about 18 million. The world crop in 1951–1952 was 1,680 million bushels.

Rye is hardier than wheat and is usually cultivated in cool regions, on sandy or light soils, and in the Eastern states on medium loams which have become physically or chemically defective and will not produce satisfactory wheat crops. It will thrive on reclaimed peaty soils. In rotation, rye occupies the same place that wheat would, and, like the latter, prefers a fine firm seed bed. For a grain crop, from one and one-quarter to two bushels per acre are usually sown in the autumn. Judicious rolling and harrowing in spring is often beneficial. The crop is harvested just before it is fully ripe, a good yield varying between 15 and 30 bushels of grain and from one to two tons of straw. The straw is particularly tough and pithy and of little feeding value. It takes a long time to rot in the manure heap when used as litter, unless it is chaffed.

Two types of rye are grown, the common or autumn-sown usually grown for grain, and the spring-sown usually sown in spring, but the former may be sown in spring and the latter in autumn. Midsummer or St. John's Day rye and giant or Tyrolese rye are spring varieties and good for forage, the latter requiring a rich soil. When grown for forage, as a cover crop, or to be plowed in as green manure, three bushels of rye may be sown per acre at various seasons of the year, the only proviso being that there shall be sufficient moisture and warmth present to insure germination and growth. Green rye is an excellent feed, either for soiling or folding in the spring, being well suited for cows in milk or ewes with lambs. As soon as the ear appears the straw becomes tough and woody, so that stock refuse it, hence it should be grown in small areas and a succession put in. A bushel weighs about 56 pounds and each pound contains on an average about 21,000 kernels.

Feeding Value and Uses.—In northern Europe the grain is largely used for breadmaking, but in this country it is chiefly employed either in the manufacture of malt and spirituous liquors, as rye whiskey, etc., or as food for stock. Holland's gin and the national Russian drink, kvass, are largely made from rye. The following table shows that rye does not differ materially from wheat in composition, nor are its by-products chemically dissimilar from those of the wheat grain:

Average percentage composition of	Water	Ash	Protein	Crude fiber	Nitrogen-free extract	Ether extract
Rye	11.6	1.9	10.6	1.7	72.5	1.7
Rye flour	13.1	0.7	6.7	0.4	78.3	0.8
Rye bran	11.6	3.6	14.7	3.5	63.8	2.8
Rye shorts	9.3	5.9	18.0	5.1	59.9	2.8

The percentage digestibility of rye meal with ruminants is: dry matter 87, protein 84, nitrogen-free extract 92, ether extract 64; while that of rye bran with pigs is: dry matter, 67, protein, 66, nitrogen-free extract 75, ether extract 58.

In milling the outer portion of the rye kernel constitutes the bran, the second layer the "middlings" or "shorts," and the inner portion the flour. For stock the whole kernel is ground. Rye flour is somewhat similar to corn meal as a source of protein and energy, but is more expensive. Ground rye and rye bran are fed to cows in Denmark. Not more than three pounds daily should be given, as they are said to have a deleterious effect upon the quality of the butter. Experiments show that for pig feeding rye is of equal value with barley, and that one pound of rye is equal to six pounds of separated milk or 12 pounds of whey; that rye shorts are inferior to rye, the pork from the former being softer and showing more shrinkage. Ground rye may be safely fed to work horses to the extent of eight or 10 pounds daily, together with other feeds, as bran or oats. Owing to the hollow stems of rye holding considerable air, this crop is not making much progress for silage purposes.

Rye straw is longer and more uniform in size than that of other grains and when unbroken it is used for packing pottery, horse collars, mattresses, etc., and in the manufacture of a variety of articles, as paper, hats, bonnets, mats, slippers, toys and fancy articles. For such purposes it often commands a good price.

Diseases.—Ergot (*Claviceps purpura*) is the chief disease and is common on other gramineae. The elongated, curved, brownish or purplish spurs of ergot form on the head in place of a kernel and are sown with the seed unless it is carefully screened. If sown, they germinate and finally send out minute spores which, attaching themselves to the grass, live on it parasitically, send out small threadlike growths which finally reach the ovary, where they displace the rye grain and reproduce the cockspur or resting spore. A cautionary word—ergot should be

removed before rye is used as feed; it is dangerous to both man and beast. See also ERGOT; ERGOTISM.

SAMUEL FRASER,
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RYE GRASS. See GRASSES.

RYE HOUSE PLOT, in English history, a conspiracy which took place in the reign of Charles II, and which became famous from the fact that its detection involved the death of Lord William Russell, Arthur Capel, the 1st earl of Essex, and Algernon Sidney (qq.v.) who were in no way connected with it. The immediate object of the Rye House Plot, which was contrived in 1683 among a number of obscure persons belonging to the party of which those celebrated men were among the leaders, was to assassinate the king and his brother, the duke of York (afterward James II), as they returned from the Newmarket races. This plan was to have been executed at a convenient spot on the road from Newmarket to London, where there was a farm called Rye House, belonging to one of the conspirators named Rumbold; but the plan was frustrated by the king and his brother who returned from Newmarket earlier than was expected. Soon after, information of the matter was laid before one of the secretaries of state, and it was added that since this plot had been frustrated the plan for a general insurrection had been taken up by various eminent persons, among whom were those mentioned. A general insurrection had indeed been talked of, and the details and probable success of such a scheme appear to have been considered by the accused persons; but there was no evidence to show that the promoters of the wider scheme were involved in the minor plot, which was engineered, after the general insurrection had first been talked of, by a few of those already concerned in the larger plan. Yet from the way in which the revelations were made to the government the two schemes were completely confounded, and Russell, Essex, and Sidney were arrested on the charge of treason. Essex put an end to his own life in the Tower, and Russell and Sidney were condemned and beheaded. Lieutenant Colonel Walcot, one of the real contrivers of the Rye House Plot, was at the same time brought to the block.

RYERSON, rī'ĕr-s'n, **Adolphus Egerton,** Canadian clergyman: b. Charlotteville, N. Y., March 24, 1803; d. Toronto, Ontario, Feb. 19, 1882. He entered the Methodist ministry in 1825, and served on the Niagara circuit until 1828, when he helped organize the Methodist Episcopal Church of Canada. In 1832 he visited England to establish a connection between the new church and the parent body. He was a founder of Victoria College, Cobourg, Ontario, and became its first president in 1841. From 1844 until 1876 he served as superintendent of public schools for Upper Canada; he resisted the efforts of the Anglicans to control university training and to restrict the benefits of public endowments to a single church. In 1829 he helped found the *Christian Guardian,* journal of the Methodists, and was its first editor.

RYKOV, rĭ'kôf, **Aleksei Ivanovich,** Russian politician: b. Saratov, 1881; d. Moscow, March 14, 1938. The son of a peasant, he was educated at the University of Kazan, in which city he met many exiled revolutionaries. He was arrested in 1902 for helping to organize a May Day demonstration, but managed to escape, and in 1905 joined the Bolsheviks. During the remaining years of the czarist regime he was again arrested and imprisoned on several occasions, and at the time of the October Revolution in 1917 he was in exile in the Narym district. He became an active collaborator of Nikolai Lenin (q.v.) when the Communists achieved power, heading the Commissariat of the Interior, serving as president of the Supreme Economic Council, and holding several other offices. After the death of Lenin in 1924 he aligned himself with Joseph Stalin (q.v.) in opposition to Leon Trotsky (q.v.), the latter's rival for power, and for six years served as president of the Soviet of People's Commissars. However, he was frequently in conflict with Stalin over policy and as a result was dismissed from office, but was reinstated in 1931 after publicly recanting his opposition. His influence and standing in the party gone, in 1936 he was arrested on a charge of plotting to assassinate Stalin. Together with other former leaders he was brought to trial for treason early in 1938, and publicly confessed to having taken part for a long period in plots against the Stalinist government which Trotsky had inspired. He was executed.

RYLAND, Henry, English painter: b. Biggleswade, Bedfordshire; d. Nov. 23, 1924. He worked in Paris in the studio of Benjamin Constant, and at the Julien Academy under Gustave R. C. Boulanger and Jules L. Lefebvre. His professional life began as a designer of stained glass, and he contributed to the *English Illustrated Magazine* in its early days. Subsequently, however, he became well known for his water colors. His first work as a painter was exhibited at the Grosvenor Gallery, and he afterwards exhibited at other galleries in London. Many of his pictures have been engraved.

RYLANDS, John, English textile manufacturer: b. St. Helens, Lancashire, Feb. 7, 1801; d. Stretford, Lancashire, Dec. 11, 1888. With his father and elder brothers, in 1819 he established at Wigan the cotton textile manufacturing firm of Rylands and Sons. Dye and bleach works and spinning mills were subsequently acquired, and in 1847 he became head of the firm. He was one of the promoters of the Manchester ship canal. His wife founded the John Rylands library, at Manchester.

RYMER, Thomas, English critic and antiquary: b. Yafforth, Yorkshire, 1641; d. London, Dec. 16, 1713. He studied at Cambridge, subsequently kept terms at Gray's Inn, and was called to the bar in 1673. In 1678 he published *Edgar, or the English Monarch,* a play in rhymed verse. Criticism of the drama was his chief interest, and his principal works in this connection were *The Tragedies of the Last Age Considered* (1678), unfavorable to the plays of Beaumont and Fletcher (q.v.), and *A Short View of Tragedy* (1692), which condemned William Shakespeare's *Othello* as "a bloody farce without salt or savour." Appointed historiographer royal in 1692, he was entrusted with the preparation of a collection of public treaties, which he began to publish in 1704, under the title of *Foedera, Conventiones, et cujuscunque Generis Acta publica, inter*

Reges Angliae et alois Principes. Of this valuable and learned work he completed 15 volumes, and five more were afterward added by Robert Sanderson. The publication of the whole work was completed in 1735.

RYMER, Thomas, of Ercildoune. See RHYMER, THOMAS THE.

RYSWICK, rĭz'wĭk, or **RIJSWIJK,** rīs'wĭk, Netherlands, a village between Delft and The Hague, famous for the celebrated Treaty of Ryswick, concluded there in September and October 1697 between France, England, Spain, Holland, and the Holy Roman Empire. It terminated the bloody nine years' War of the Grand Alliance against France. Louis XIV relinquished his recent conquests except Strassburg (Strasbourg), which had been taken in 1681; he abandoned Lorraine and Luxembourg, acknowledged the independence of Holland, repudiated the Stuarts, and recognized the Protestant succession in England (William III).

RYTI, rü'tĭ, Rĭsto, Finnish statesman: b. Huittinen, Feb. 3, 1889. He graduated in law at Helsingfors (Helsinki) University in 1909, and until World War I he practiced his profession, first at Rauma and, after 1914, in Helsinki. In 1919 he entered the legislature of the newly constituted republic of Finland; as minister of finance, 1921–1924, he visited the United States to conclude the Finnish debt agreement. After returning to Helsinki in 1923 he was also appointed governor of the Bank of Finland. He was Finland's delegate to the League of Nations in 1932, and vice chairman of the country's delegation to the World Economic Conference in London the next year. On Dec. 1, 1939, the day after Finland became involved in war with Russia, he was made prime minister. He was opposed to the peace made with Russia on March 7, 1940. In November he became acting president of the republic in succession to Kyösti Kallio, who had resigned; the latter shortly died, and on Dec. 22, 1940, Ryti became Finland's fifth president. When German armies invaded Russia on June 22, 1941, he took his country into war again with the Soviet Union. On June 25, 1944, he pledged not to make peace, in what had become a disastrous war for Finland, without Germany's consent; but defeat could not be staved off, and on August 1 he resigned the presidency in favor of Field Marshal Carl G. E. von Mannerheim. With other leaders, he was subsequently brought to trial in Helsinki for leading Finland into World War II on the side of Germany; convicted on Feb. 21, 1946, he was condemned to imprisonment for 10 years, receiving the heaviest sentence of all those accused. On May 19, 1949, he was pardoned by President Juho Paasikivi.

RYUKYU, r'yōō'kyōō, **ISLANDS,** (Jap. NANSEI SHOTO), an archipelago in the Pacific Ocean, until World War II an integral part of the Japanese Empire, known also as the Liukiu, or Luchu, Islands. The islands, some 60 in number, extend in an almost uninterrupted chain southward from Kyushu nearly to Formosa (Taiwan); the total area is 1,844 square miles, and the population in 1940 numbered 840,379. From northeast to southwest, the archipelago is divided into five lesser groups: Osumi Gunto, Tokara Gunto, Amami Gunto, Okinawa Gunto, and Sakishima Gunto. The first three of these groups are officially combined under the name Satsunan Shoto by the Japanese; and Amami Gunto and Okinawa Gunto comprise the Ryukyu Retto on Japanese sources. Thus Ryukyu Retto and Ryukyu Islands, which are simply Japanese and English forms of the same name, are applied to two different entities; frequently this has been a source of much confusion. Okinawa (q.v.), or Okinawa Shima, principal island of the group named Okinawa Gunto, is by far the most densely populated of the islands; situated about 370 miles from Kyushu and 825 miles from Tokyo, it is 70 miles long and averages about 7 miles in width. Naha, or Nawa, on the southwest coast, a city with 66,000 inhabitants, is the capital of the Ryukyu prefecture; a railroad links it with Yonabaru, a naval base on Nakagusuku Bay, on the southeast coast. The mountainous northeastern part of Okinawa is sparsely populated; elsewhere, on rolling open hills are numerous small farms where rice, sugar, wheat, sago, and potatoes are cultivated. Fine lacquer ware is also manufactured, and saki, an alcoholic drink, is made from rice; the fisheries are of importance. Okinawa was visited in 1853 by Commodore Matthew Calbraith Perry (q.v.), who purchased a plot of ground near Tumai as an American cemetery in perpetuity.

The Ryukyus became subject to China in the 14th century, and in 1609 they were conquered by the Japanese prince of Satsuma. Thereafter the local rulers paid tribute to both China and Japan until 1879, when the Japanese organized the archipelago as a prefecture; this status was recognized by China in 1895, following the Sino-Japanese War.

Okinawa had been heavily fortified by Japan prior to World War II, and on April 1, 1945, following a long bombardment, the island was invaded by troops of the United States Tenth Army led by Lieut. Gen. Simon Bolivar Buckner, Jr. (q.v.). The campaign that ensued was the most arduous in the war in the Pacific down to that time. Before organized resistance ceased on June 21, 82 days later, General Buckner had been killed, as well as Ernie Pyle, popular newspaper correspondent, who met his death in an assault on Ie, a small island off the northwest coast of Okinawa. Total American casualties were 46,319 (11,897 killed and 34,422 wounded); the Japanese lost 101,853 killed (including Lieut. Gen. Mitsuru Ushijima, commanding on Okinawa) and 9,498 taken prsoner, a total of 111,351 men. Most of the other islands of the Ryukyu group remained in Japanese possession until the war's end. Documents surrendering them unconditionally were signed on Okinawa on Sept. 7, 1945, the Allied powers at the surrender ceremony being represented by Gen. Joseph Warren Stilwell (q.v.); the Japanese Army and Navy, whose forces in the archipelago at that time numbered 105,000 officers and men, were represented at the signing by Lieut. Gen. Toshiro Nomi.

RZHEV, rzhĕf, USSR, a city of the Kalinin Region, RSFSR, situated on both banks of the Volga River, 135 miles northwest of Moscow and 90 miles southwest of Kalinin (Tver). There is a considerable transit trade at Rzhev, carried on the Volga and the four railroad lines which enter the city. Industries include shipbuilding and manufactures of paper, leather, textiles, machinery, and matches. Rzhev, which dates from the 11th century, formed part of the principality of Smolensk. Pop. (1939) 54,081.

S the nineteenth letter and fifteenth consonant of the English and several other alphabets, is classed as a sibilant or hissing letter. The sibilant is produced by emission of the breath while the end of the tongue is brought close to the front palate just behind the gums; this is the hard open sound; the corresponding soft open sound is represented in the alphabet by *z*, but in practice is often represented by *s*. The form S is the Semitic *shin*, and the ancient Greek character ς (sigma) with its angles rounded; in the existing Greek alphabet the s is represented by Σ. In some English words s is silent: island, aisle. The final *th* of verbs has changed to *s* because of the nearness of sound of *s* to *th: loveth, loves; hath, has.* There are several words in English — and the like can be said of Greek — which, beginning with *m* or *p* or *l*, take on an initial *s; melt, smelt; pike, spike; lick, slick;* Gr. *mikros, smikros.* Compare Ger. *niesen;* Eng. *sneeze.* The palatalization which is so characteristic of English and the romance languages has had the effect of generally giving to *c* or *sc* before *e, i* or *y* the sound of *s*. Sometimes the sound of *s* is changed to that of *st*; the verb *hoise* becomes *hoist, whiles* becomes *whilst*; and there is the mispronunciation of *once, onst*; and the plural of *mouse* is *mice.* The digraph *sh* stands usually for the ancient sc (sk): Old Eng. *sceal,* shall, fisc, fish. It is pronounced with the edges of the tongue appressed to the teeth, but with the centre free; *s* alone represents this sound in *sure, sugar, issue,* etc. This sound is a surd; *s* represents its sonant *in osier, measure,* etc.: *sh* is replaced by *ch* in *machine; ci* in *social; sci* in *conscience; ti* in *martial,* all of which words are of Latin or French extraction. S stands for *south, second, sulphur, shilling,* and in combinations for science or society. SS. stands for steamship. See ALPHABET.

S. P. Q. R., the initial letters of Senatus Populusque Romanus (the Senate and the Roman people), which expressed the political character of the Latin nation. These initials were carried as a battle standard by the Roman armies.

SS., commonly used at the head of affidavits and other legal documents, follows the brace which includes the state and county names where the paper is witnessed or the action at law laid. On legal documents SS. or ss. (scilicet), it is said, signifies "to wit," "namely."

"SS" is also "a symbol of unknown antiquity worn on the collars of the superior judges and lord mayors of England; formerly by persons attached to the royal household and others. It was assumed by certain classes, never bestowed and had no connection with heraldry." — Storemouth.

From being an ornament of royalty, supposed originally to signify "sovereignty," it became the badge of followers of the house of Lancaster and passed unofficially to persons in authority, like magistrates, mayors and justices; and from being used upon the collar came to be used on official writings to indicate the authority of the magistrate, mayor or judge who gave the same.

The mysterious "ss" is then, we may conclude, a symbol of official position. Whatever the origin of the symbol, the "esses" is an ornament, passed into a sign of judicial or magisterial authority, and as such follows the name of the State or county where a document is witnessed or an action at law is laid.

SA DE MIRANDA, Francisco de, frän-thēs'kō dā sä dā mē-rän'dä, Portuguese poet: b. Coimbra, Portugal, 27 Oct. 1485; d. there, 15 March 1558. He wrote much in Spanish, taking for his models Dante and Petrarch, but in sentiment remained entirely loyal to his native country. His fame rests chiefly upon his poetical epistles and eclogues, though his entire work is excellent and characterized by sincerity and love of natural beauty. He is ranked as one of the six greatest Portuguese poets. An edition of his work edited by Caroline Michaëlis de Vasconcellos contains 189 of his pieces, 74 of which are in Castilian.

SAADJA GAON, sä-äd'yä gā-ōn' (SAADJA BEN JOSEPH, Arab SAID), Jewish Rabbin: b. Fayum, the Biblical Pithom, Egypt, 892; d. Babylonia 941. In 828 he was appointed Gaon or principal of the Jewish Academy at Sura, near Babylon, into which dwindling institution his zeal and learning infused new life. His acquirements were many and varied, living in a time when philosophy and reason were in danger of usurping the authority hitherto wielded by tradition, to which end the Karaites particularly contributed. It was the work of Saadja to discover a common ground for the maintenance of Jewish dogma side by side with philosophical theory. This was the object of his great work, written in Arabic, 'Emunot w'deot' ('Faith and Ethics') which was translated into Hebrew by Juda ibn Tibbon (1160) and into German by Fürst (1845). Saadja wrote a commentary on some of the books of the Old Testament, treatises on grammar and hymns for the synagogue. On the 1000th anniversary of his birth a complete edition of his works was published by Joseph Derenbourg. Consult Grätz, 'Geschichte der Jüden' (1870); Guttmann, 'Die Religionsphilosophie des Saadja' (1882).

SAALE, zä'lĕ, two rivers, Germany. The Saxonian Saale rises in the Fichtelgebirge in northeast Bavaria, and flows north for 265 miles into the Elbe, through East Germany. It has dams with large reservoirs, and is navigable for the last 100 miles from Naumburg. The Franconian Saale rises on the Bavarian-Thuringian border and flows southwest for 84 miles to join the Main River at Gemünden in West Germany.

SAAR, zär, or **SAAR TERRITORY** (Fr. SARRE), a district on the Franco-German border southeast of and adjoining Luxembourg, linked to France since World War II by an economic and customs union, and to Germany by the fact that the inhabitants are racially as well as linguistically Germans. With an area of 991 square miles, and having 987,650 inhabitants (Jan. 1, 1955), it has a population density of nearly 1,000 per square mile. The Saar River, rising in France in the lower Vosges Mountains and passing the French towns of Sarrebourg and Sarre-Union, at a short distance north of Sarreguemines, forms a sector of the border line between the Saar and France's Moselle Department. The river then traverses the Saar Territory and flows past the territorial capital, Saarbrücken, also Völklingen, Saarlouis, and Merzig; emerging into Germany's Rheinland-Pfalz, it debouches in the Mosel (Moselle). The topographic designation "Saar (Sarre) Basin" is often used as a synonym for the territory.

Economy.—The richness of its coal deposits and the productivity of its iron and steel works have combined to make the Saar one of the most important mining-metallurgical centers of Europe. The resources of the Saar are of major importance to both German and French economies. The Saar's coal is essential to the economic working of Lorraine's iron and steel works, while the Saar's own iron and steel plants must utilize the minette iron ore of Lorraine, the territory lacking any ore deposits of its own. In metric tons the 1954 coal production was 16,800,000; raw steel, 2,800,000; pig iron, 2,600,000. Of the Saar's 315,700 workers some 66,400, or 22 per cent, were employed in the mines.

History.—Ceded by France to Germany in 1815, the Saar Territory was artificially constituted in 1919, after Germany's defeat in World War I, from portions of Rhenish Prussia and the Bavarian Palatinate. According to the terms of the Versailles Treaty (Art. 49, *et seq.*) the "Saar Basin" was placed provisionally under a special regime instituted by the League of Nations with the economic object of giving to France its coal production for a term of years in compensation for Germany's deliberate destruction of French coal mines in occupied Nord and Pas-de-Calais. At the close of an agreed 15-year period, in 1935, a plebiscite was held. The inhabitants by a large majority elected to return to German rule. Germany thereupon entered into possession and repurchased the mines from France. After World War II the territory again came under French rule. The French encouraged an autonomy movement and gave their blessings to a constitution, adopted in 1947, which established an elective government with power over internal affairs. On Oct. 23, 1954, an agreement was signed by France and the German Federal Republic providing for continuance of the economic and customs union with France, and for internal autonomy. This was supplemented by a Franco-Saar protocol of March 21, 1955, recording agreement on various points. Saar elections for a new parliament were held Dec. 18, 1955. Although pro-Germans captured 33 out of the 50 seats, they lacked the 75 per cent majority needed to unite the Saar with the German Federal Republic and left the Saar independent, though with expectation of eventual union with Germany.

SAARBRUCKEN, zär-brük'ĕn, city, Saar, of which it is the capital, on the Saar River at the mouth of the Sulz River, 100 miles southwest of Frankfurt am Main. Across the river is Forbach, France. It is a rail center in a large industrial and coal-mining region, and its manufactures include steel products, machinery, clothing, food processing, and many others. There is an airport. It became the capital of the Saar in 1919, after a history in which it changed hands between French and Germans many times. Some of its historic buildings were destroyed in World War II, and it was captured by United States troops in March 1945. Pop. (1955) 119,388.

SAARINEN, sä'rĭ-nĕn **(Gottlieb) Eliel**, Finnish architect: b. Helsingfors (now Helsinki), Finland, Aug. 20, 1873; d. Bloomfield Hills, Mich., July 1, 1950. Educated at the Institute Polytechnic in Helsinki, Saarinen won many prizes for his city plans and architectural designs before going to the United States in 1923. With his partners Armas Lindgren and Herman Gesellius, he designed the Finnish Pavilion at the Paris Exposition of 1900, the national museum at Helsinki, and, after setting up for himself, the League of Nations building in Geneva. His skyscraper designs greatly influenced American architects, based as they were on sound engineering free from ornamentation. In Detroit he was head of the architectural department of the Cranbrook Foundation, and designed many of the buildings for Cranbrook School and Cranbrook Academy. Other designs were halls for the Berkshire music festival at Stockbridge, Mass., a design for an addition to the Smithsonian Institution in Washington, D.C., for which he received the highest award of the American Institute of Architects, and uncompleted plans for improving Chicago and Detroit. He wrote *The City: Its Growth, Its Decay, Its Future* (1943) and *Search for Form* (1948). His son, EERO SAARINEN (b. 1910), also an architect, who worked with his father, has won many prizes in competitions, and designed schools and housing centers. His most notable achievement has been the auditorium for the Massachusetts Institute of Technology (1953).

SAAVEDRA LAMAS, sä'ä-vā'thrä lä'mäs, **Carlos**, Argentine lawyer, diplomat, and statesman: b. Buenos Aires, Argentina, Nov. 1, 1878. He became professor of international law at the University of Buenos Aires, where he had been a student. In 1928 he presided over the 11th International Labor Conference in Geneva. Elected to the Chamber of Deputies, he became Argentine foreign minister (1932–1938), when he drafted an antiwar pact which was signed by 13 American republics, including the United States. While presiding over the Chaco Peace Conference (1935) he helped to end the war between Bolivia and Paraguay, and was awarded the Nobel Peace Prize in 1936. In that year he presided over the Assembly of the League of Nations. He was

president of the University of Buenos Aires (1941–1943) and professor of labor legislation (1943–1946). He has written several books on law and the way to preserve peace.

SABA, sä'bä, island, Netherlands Antilles, one of the Leeward Islands, 5 square miles in area, 30 miles northwest of St. Kitts. It consists entirely of an extinct volcanic cone, 2,900 feet high. The capital, called The Bottom, is in the crater of the volcano, about 700 feet above sea level. Two landing bays—the Fort Bay and the Ladder Bay—the latter having 530 steps leading up to The Bottom, are used by the fishermen, who carry on the chief industry and grow some agricultural products. The trade is mainly with Curaçao. There are four schools, but education is not compulsory. An administrator assisted by two deputies is head of the island, responsible to the central government in Curaçao. The three islands of St. Martin, St. Eustatius, and Saba have a council of 15 members, 5 to each. Pop. (1951) 1,098.

SABAC, shä'bäts, town, Yugoslavia, on the Sava River, 40 miles west of Belgrade on the Yugoslav State Railways. It is a busy river port and the trade center of the region between the Sava and Drina rivers. Plums, honey, livestock, and fish are the chief products. Founded by the Turks in the 15th century, it was later part of the kingdom of Serbia until 1918; was occupied by the Germans in World War II, and became part of the Serbian People's Republic of Yugoslavia in 1946. Pop. (1948) 18,238.

SABADELL, sä-vä-thĕl', city, Spain, in Barcelona Province, Catalonia, 12 miles northwest of Barcelona on the electrified section of the Spanish National Railways from Barcelona to Manresa. The textile industry is the chief occupation, but many manufactures are carried on, including diesel engines, tools, leather goods, paper, soap, and liqueurs. Wheat and grapes are grown in the district. The town dates from the 13th century. Pop. (1949 est.) 59,835.

SABADILLA, săb-ă-dĭl'ă (Sp. *cebadilla*), a Mexican plant; also the pharmaceutical term for seeds of the liliaceous plant *Schoenocaulon officinalis* which has a bulbous root, grasslike leaves, and a flower stalk some six feet in height. The papery, tricapsular fruits contain a few pointed, wrinkled, blackish seeds, acrid and causing sneezing, a powerful irritant, and poisonous. They are used to make veratrine, which, as a tincture or ointment, is used as an external application for neuralgia and rheumatism. Its chief use is for killing vermin.

SABAEANS, să-bē'ănz (Arab. *Saba'*), one of the three major peoples who played an important role in the history of ancient South Arabia, the other two being the Minaeans and the Himyarites.

The Sabaeans were the first South Arabian people to step within the threshold of civilization. They are the Sheba of the Old Testament (Gen. 10:7; 25:3) and the Sab'ai of the 8th century cuneiform inscriptions of Mesopotamia. The earliest Western reference to them occurs in Greek of the second half of the 3d century B.C. Their habitat was the southwestern corner of the Arabian peninsula, now called Yemen. The fertility of this rain-favored land, its proximity to the sea and its strategic location on the route to India gave it decided advantages over Hejaz in the north and made it the seat of a flourishing culture long before the rise of Islam.

Until the last quarter of the 19th century our firsthand knowledge of this South Arabian civilization was fragmentary and meager. Islam did not encourage its study or any pre-Islamic study. Explorations were forbidden. A Danish scholar and traveler, Carsten Niebuhr, was the first to announce (1772) the existence of South Arabic inscriptions. A French Jew, Joseph Halévy, was the first European to penetrate into inner Yemen (1869–1870). Disguised as a rabbi from Jerusalem seeking alms for the Jews he brought back 685 inscriptions from 37 different localities. He was followed by Eduard Glaser, whose explorations between 1882 and 1894 yielded some 2,000 inscriptions extending as far back as the 7th century B.C. The inscriptions are written in alphabetic characters, somewhat related to Phoenician, and reveal a long period of development. The decipherment of South Arabic, a sister of North Arabic in which the Koran is written, gave the world the first opportunity to hear what the Sabaeans and other South Arabians had to say about themselves.

As revealed by inscriptions, classical writings, and recent excavations, the last of which was by an American (1950–1952), the South Arabians achieved a high degree of civilization and prosperity based upon agriculture and trade. Their religion was in essence a planetary astral system in which the cult of the moon god, known to the Sabaeans as Almaqah (health giving), prevailed. During at least the last millennium before Christ and two centuries after Christ, they almost monopolized the international trade of the Red Sea and the Indian Ocean, as well as the land trade that took frankincense, myrrh, spices, condiments, and other tropical products through Arabia into the Mediterranean port. Some of these products came from India or East Africa. Incense was highly prized for ritual use and for Egyptian mummification. In their heyday the Sabaeans had colonies or trading posts all the way through North Arabia, from one of which the Queen of Sheba—if historical—must have come. She is named Bilqīs in Moslem tradition.

By the mid-8th century B.C., the Sabaeans had established a kingdom of their own with Ma'rib for capital. The kingdom lasted until about 115 B.C. In the first period ending about 450 B.C. a priest-king, bearing the title Mukarrib Saba, stood at the head of the state. In the second period the ruler appears shorn of his priestly character and bearing the title Malk (king of) Saba.

The capital Ma'rib lies about 60 miles east of the present capital of Yemen, San'a, and rises 3,900 feet above the sea. It has been visited by only a few Europeans. Its historical fame rests on its dam (*sadd*), a remarkable engineering feat intended to create an artificial reservoir between hills for the irrigation of neighboring lands. The older portions of the dam were constructed in the mid-7th century B.C. by Sumhu'alay Yanūf and his son Yatha'amar Bayyin.

Arab historians ascribe the entire decay of South Arabian civilization to the "bursting of the great dam" shortly before the rise of Islam. In fact, the decay was due to a variety of economic and political causes, one of which was the entry of Roman-Egyptian shipping into the Indian Ocean and the shift in the trade routes.

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PHILIP K. HITTI.

SABATIER, sà-bà-tyā′, **Paul,** French chemist: b. Carcassone, France, Nov. 5, 1854; d. Toulouse, Aug. 14, 1941. He began his research work as assistant to Marcelin Berthelot, then became a member of the faculty of Nîmes University (1877), and was professor at Bordeaux (1880–1882). He then went to Toulouse as professor of chemistry, and became dean of its science faculty in 1905. With Victor Grignard, he was awarded the Nobel Prize in chemistry (1912). He was known for his method of hydrogenating organic compounds in the presence of finely divided metals, and research that paved the way for the discovery of synthetic gasoline. He wrote *La catalyse en chimie organique* (1913).

SABATIER, Paul, French historian and Protestant clergyman: b. St. Michel-de-Chabrillanoux, France, Aug. 3, 1858; d. Strasbourg, March 5, 1928. Sabatier was educated at the Faculty of Theology in Paris, and in 1885 became vicar of the French parish of St. Nicholas in Strasbourg. The German government offered him a superior appointment if he would become a German citizen; he asked to be allowed to retain his post as vicar, but the request was considered a political matter, and he was banished from the country. For a brief time he was pastor of St.-Cierge-la-Serre; then he withdrew from the ministry to devote himself to historical studies.

His chief work was *Vie de Saint François d'Assise* (1893), based largely on previously unutilized documents discovered by him in various Italian archives. He published also *La didachê ou l'enseignement des douze apôtres* (1885), and edited the *Speculum perfectionis,* attributed to Leo of Assisi (1898), and *Tractatus de Indulgentia S. Mariae de Portiuncula,* collected by Franciscus Bartholus (1900).

SABATINI, sä-bä-tē′nē, **Rafael,** Anglo-Italian author: b. Jesi, Italy, April 29, 1875; d. Adelboden, Switzerland, Feb. 13, 1950. The son of an Italian tenor and an English soprano, young Sabatini was educated in Switzerland and Portugal. At 17 he could read and write six languages, an accomplishment that encouraged him to begin a business career in Liverpool, England. After 10 years of writing commercial correspondence to foreign firms, he began to write short stories. In 1904 he wrote his first novel, *The Tavern Knight.*

Often called "the modern Dumas," he was the author of over 40 historical novels, biographies, and plays. His best-known novels were *Captain Blood* (1922), *The Sea Hawk* (1915), and *Scaramouche* (1921), all produced on the screen.

In addition to the books mentioned, he wrote *The Trampling of the Lilies* (1906); *The Life of Cesare Borgia* (1912); *The Gates of Doom* (1914); *The Snare* (1917); *The Historical Nights Entertainment* (1918); *Fortune's Fool* (1923); *The Chronicles of Captain Blood* (1931); *Scaramouche the King Maker* (1931); *Chivalry* (1935); *The Fortunes of Captain Blood* (1936); *The Sword of Islam* (1938); *Columbus* (1942); *The Gamester* (1949); and many others.

SABBATAI ZEBI or **ZEVI,** sä-bät′ä-ī tsĕ-vē′ (also SHABBETHAI), Hebrew mystic: b. Smyrna 1626; d. 1676. He was a man of great learning and magnetic presence, and he led thousands of followers, mainly in Smyrna, Salonika, Alexandria, and Jerusalem, to believe in him as the Messiah. In 1664 he had about 80,000 followers. In the following year the beginning of the Messianic reign within a few months, and the rebuilding of the temple in the next year were proclaimed in the streets of Alexandria by Sabbatai and six disciples, clad in white raiments, with garlands on their heads. Having excited serious alarm at Constantinople, he was apprehended at Smyrna, and terrified into a recantation of his mission. He was said to have declared that his sole object had been to embrace Islam and to carry over all the Jews with him. The sultan declared himself satisfied and honored him with the title of an effendi, giving him an honorary post at the same time. He again aroused the jealousy of the Turks and was either poisoned in prison or publicly executed.

SABBATARIAN CONTROVERSY, the dispute in various forms between those who urge and those who oppose a rigid observance of Sunday. It has been going on from the time of King James I, of England, who favored Sunday sports, and thereby offended many of his subjects, and it has in late years included proposals to throw open to the public museums, libraries and galleries and other places of recreation and instruction, on the first day of the week. Most of these changes have been generally adopted.

SABBATH, the ancient Hebrews' weekly day of rest. In Hebrew the word means to cease, and the expression of Josephus (Apion 2:2), who explains it as meaning "a rest from all labor," is rather to be looked upon as a commentary than as a derivation etymologically correct.

The Sabbath was the seventh day of the Hebrew week and lasted from sunset on Friday to sunset on Saturday. It was celebrated as a holy day; a day of rest and rejoicing; by ceasing from all labor, and by causing servants, strangers and cattle to cease also. Plants were not to be sown nor reaped on that day. The services of priests and Levites in and about the tabernacle and temple were, however, to be performed through the Sabbath day. Circumcision, too, could take place on the Sabbath, when it fell on the eighth day after the birth of a male child.

Profanation of the Sabbath was punished by stoning to death. It was not until after the exile that the character of the work by which the Sabbath could be profaned was strictly defined. In the law only one act of labor was specifically prohibited, that of lighting a fire for the purpose of cooking. According to Josephus, armies never proceeded on their march on the Sabbath.

Origin of the Sabbath.—The Sabbath appears to have been an institution of religion long prior to Moses. It is sometimes said that it was borrowed by him from older nations, such as the Egyptians. Such Latin writers as

Seneca and Ovid give intimations that the veneration for the seventh day had found some favor among the early Romans. It seems more natural to suppose that it had come down with the old traditions of theocratic religion which are found embalmed in the first chapter of Genesis. The poem of the creation, in which God is related to have created the world in six days and rested on the seventh day, embodies a tradition much earlier than the period of Mosaic legislation. There are several intimations in the patriarchal age that the followers of Jehovah, such as Abraham and Isaac, chose certain times for rest, meditation, prayer and sacrifice to God. In after times it would almost seem as if the poem or hymn of the creation was used as a special part of Sabbath-day devotions. On that day the people were called to reflect upon the fact that the whole universe, including themselves, had an origin in one personal and supreme Being; that He had exerted His Omnipotence for a definite period and then had ceased from His work. They were constantly to remind themselves of the work of God, once for all completed, by their own six days' round of labor; and as God has rested from His work so were they to rest from theirs and to turn their thoughts toward Jehovah «who had done so great things for them.»

Mosaic Ordinances of the Sabbath.— The scope and meaning of the Sabbath-day was very much extended and amplified by the provisions of the law as contained in the Hexateuch. It was made to be a day on which not only the finished task of creation was to be commemorated, but on which the great providential deliverances of the children of Israel were likewise to be recalled. But first of all the command is given by the law in various forms of speech, but with the same intent throughout the books of the law, Exodus, Deuteronomy and Leviticus, to remember the seventh day, the Sabbath, to keep it holy; most specifically in Lev. xxiii, 3: «Six days shall work be done: but the seventh day is the Sabbath of rest, an holy convocation; ye shall do no work therein: it is the Sabbath of the Lord in all your dwelling.»

First of all there are three specifications as to the manner in which the week is to be spent: (1) by labor — «Six days shalt thou labor, and do all thy work:» (Ex. xx, 9); (2) by rest on the seventh day; on this day the people are ordered to rest, literally to take breath, then are enumerated in detail those who are enjoined from work: «Thou, nor thy son, nor thy daughter, thy manservant, nor thy maidservant, nor thy cattle, nor the stranger that is within thy gates.» The penalty of death is threatened against all who shall disobey this command. The reasons of this command are given: (1) as a counsel of mercy — «Six days thou shalt do thy work, and on the seventh day thou shalt rest, that thine ox and thine ass may rest, and the son of thine handmaid, and the stranger, may be refreshed» (Ex. xxiii, 12); (2) as a commemoration of the deliverance from Egypt — «And remember thou wast a servant in the land of Egypt, and that the Lord thy God brought thee out thence through a mighty hand and by a stretched out arm, therefore the Lord thy God commanded thee to keep the Sabbath day» (Deut. v, 15); (3) as a commemoration of the finished creation «For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day: wherefore the Lord blessed the Sabbath day, and hallowed it» (Ex. xx, 11); (4) as a sign of the covenant, just as circumcision was the sign of the Abrahamic covenant, and the rainbow the sign of the covenant with Noah — «Speak thou also unto the children of Israel saying: Verily my Sabbaths ye shall keep, for it is a sign between me and you throughout your generations, that ye may know that I am the Lord that doth sanctify you. . . . It is a sign between me and the children of Israel for ever: for in six days the Lord made heaven and earth, and on the seventh day He rested, and was refreshed» (Ex. xxxi, 13, 17).

The Jews of to-day who profess to keep up the tradition of their fathers still keep the Sabbath as a joyful festival. The Sabbath is held from Friday evening to Saturday evening. It is among some of them considered a pious observance to begin the celebration half an hour before Friday's sunset and to continue it half an hour after sunset on Saturday for the benefit of the souls of those who are in torment, for they believe that the damned are allowed a mitigation of their suffering during the feast. On Friday afternoon all the food for the following day is prepared, and their festal array is laid out for the Sabbath. Some Jews have special raiment which they wear only on that day; on the morning of which the Sabbath lamp is lit and the Sabbath bread laid on the table. The master of the house at the close of the evening meal blesses the wine and passes it around. They eat three meals on the Sabbath-day and they have a maxim that it is good to honor the day in the body, in dress, in eating and in drinking. Consult Abrahams, Israel, 'Jewish Life in the Middle Ages' (London 1896); Floody, R. J., 'Scientific Basis of Sabbath and Sunday' (2d ed., Boston 1906); Jastrow, Morris, 'Hebrew and Babylonian Traditions' (New York 1914); Lotz, Wilhelm, 'Quæstiones de historia Sabbati' (Leipzig 1883).

SABBATIA, a genus of *Gentianaceæ*, often growing in sand or salt marshes. These plants have verticillate leaves, handsome terminal flowers, with white or pink rotate corollas 5 to 12-merous; 4 to 12 stamens with thread-like filaments and two-cleft styles, capsules more or less globose, coriaceous and containing many small reticulated seeds. Several species have a tonic, although bitter, juice, and are used as febrifuges. Although named in honor of an early Italian botanist, Sabbati, the genus is said to be so called because the Pilgrim Fathers discovered the local *S. stellaris* on a Sabbath. This charming species, called the marsh pink, or Rose of Plymouth, bears a very delicate pink flower, with a star-shaped yellowish eye.

SABBATICAL YEAR, the seventh year which the law of Moses provided should be a year of rest for the land (Ex. xxiii, 10, 11; Lev. xxv, 1–7). The land was not to be sown and that which grew of its own accord was not to be reaped, but to be left for the poor to eat. Vineyards and oliveyards were also to be left uncultivated, and their produce ungathered; but the people were allowed to fish and hunt, and attend to their bees and flocks, and a triple produce was promised for every sixth year to

make up for the deficiency of the seventh. The sabbatical year was also to be a year of release for Jewish debtors (Deut. xv, 1–6), but those who were able to lend were strictly enjoined not to refuse loans to poor and needy persons because the year of release was at hand (Deut. xv, 7–11). In this year also the law was to be read solemnly to all the people assembled at the feast of Tabernacles (Deut. xxxi, 10). This institution seems to have been almost entirely ignored during the period which preceded the captivity, and in 2 Chron. xxxvi, 21, the time of the captivity is represented as one in which the land was enabled, by the will of God, to enjoy the sabbaths or years of rest that the Israelites had omitted to allow it. After the captivity Nehemiah sought to secure the better observance of the septennial sabbath, as he did that of the weekly sabbath (Neh. x, 31), and he seems to have had some success in the former as well as in the latter effort. The historic fact that Alexander the Great remitted the Jewish tribute in the seventh year because the Jews were debarred by their religion from employing the means of raising it, shows that it was observed a hundred years after the time of Nehemiah.

SABBATION, sąb-bā′tē-ŏn, or **SAMBATYON,** sąm-bā′tē-ŏn, Syria, a legendary river in Hebrew history, mentioned in the Midrash Gen. Rabba, lxxiii, in the Palestinian Talmud, by Josephus, as "the Sabbatic river," and by Pliny as "a river that ran for six days and rested on the seventh," whence its name, derived from the Hebrew *Shabbāth* — Sabbath. It has been assumed to be the stream issuing from Fauwar ed-Deir, an intermittent spring in Lebanon. Mohammedans identify it with the Nahr-al-Arus in the neighborhood described by Josephus, which in modern times flows every third day. The river came into prominence in the 9th century owing to the story of the 'Children of Moses,' by Eldad the Danite, who describes the territory of the site of the exile of the Ten Tribes as surrounded by "this river of sand and stone which rolls during six working days and rests on the Sabbath day. As soon as the Sabbath begins, fire surrounds the river, and the flames remain until the next evening, when the Sabbath ends." The legend with variants has been repeated by different authors in succeeding centuries. See LOST TEN TRIBES, THE.

SABELLA, a genus of annelids dwelling on sandy shores in tubes formed solely of sand, the particles of which are glued together by means of a natural cement secreted by the worms, and thus form a smooth regular tube, presenting a striking contrast in its uniformity to the rougher dwelling-tubes of allied genera, such as *Terebella.* The worm itself possesses a slender body, the hinder part of which may be doubled up within the tube. The head is provided with slender tentacles.

SABELLIANISM, the theological views of Sabellius (q.v.), which, though they had numerous advocates, were condemned by the Church as heretical. See MONARCHIANS.

SABELLIUS, są-bĕl′ĭ-ŭs, Christian teacher: b. Pentapolis, Africa, or Italy. He taught at Ptolemais in Upper Egypt during the pontificate of Zephyrinus (199–217) and Calixtus I (217–222), and is known as the founder of a sect who considered the Son and Holy Ghost only as different revelations or manifestations of the Godhead, but not as separate persons (see MONARCHIANS). The doctrines of Sabellius were opposed by Dionysius of Alexandria and Dionysius of Rome, by Epiphanius (who states that the Sabellians were very numerous around Rome and in Mesopotamia) and by Theodoret. Saint Augustine states that by the beginning of the 5th century they had entirely disappeared. Yet their views have always found adherents, and even now some theologians attempt to reconcile theology with reason by admitting conceptions of the Trinity coinciding with that of Sabellius. For his teaching Sabellius was excommunicated by Pope Calixtus.

SABIANS. See SABÆANS.

SABIN, sā′bĭn, **Alvah Horton,** American chemist: b. Norfolk, N. Y., 9 April 1851. He was graduated at Bowdoin College in 1876 and was professor of chemistry at the University of Vermont in 1880–86, also serving as State chemist in 1882–86. In 1888–1905 he was engaged in the varnish business in New York, and in 1910–37 was consulting chemist for the National Lead Company, New York. He was lecturer at New York University 1897–1925. He invented the process for manufacturing sugar of milk in 1883. Since 1907 he has been sectional editor of the *Chemical Abstracts Journal* of the American Chemical Society. Author of 'Industrial and Artistic Technology of Paint and Varnish' (1904); 'Red Lead and Paint Material' (1917); 'House Painting' (4th ed. 1928); 'Painting Structural Steel' (1929).

SABIN, Edwin Legrand, American writer: b. Rockford, Ill., 23 Dec. 1870. He was graduated from the University of Iowa in 1892 and has published 'The Making of Iowa' (1900); 'The Magic Mashie' (1902); 'Beaufort Chums' (1905); 'When You Were a Boy' (1905); 'Bar B Boys' (1909); 'Range and Trail' (1910); 'Circle K' (1911); 'Old Four Toes' (1912); 'Pluck on the Long Trail' (1912); 'With Carson and Fremont' (1912); 'Treasure Mountain' (1913); 'On the Plains With Custer' (1913); 'Scarface Ranch' (1914); 'Kit Carson Days' (a biography, 1914); 'Buffalo Bill and the Overland Trail' (1914); 'Gold Seekers of '49' (1915); 'With Sam Houston in Texas' (1916); 'The Boy Settler' (1916); 'Opening the West with Lewis and Clark' (1917); 'The Great Pike's Peak Rush' (1917); 'White Indian' (1925); 'Rio Bravo' (1926); 'Old Jim Bridger, etc.' (1928); 'Gold' (1929).

SABIN, Ellen Clara, American educator: b. Sun Prairie, Wis., Nov. 29, 1850; d. Madison, Wis., Feb. 3, 1949. Her father, Samuel Henry Sabin, served in the 40th Wisconsin regiment in the Civil War. Miss Sabin studied at the University of Wisconsin in 1865–1868, and in 1895 received from that institution the honorary degree of A.M. In 1912 Beloit College conferred on her the degree of Litt.D. and in 1915 she received the degree of LL.D. from Grinnell. Miss Sabin began her professional career in 1866 as teacher in the district school at Sun Prairie, Wis.; from 1869 to 1872 she was employed as teacher at Madison, Wis., where she became principal of the grammar school.

In 1873–85 she taught in Portland, Ore., spent the year 1885–86 in Europe, and in 1887–90 was superintendent of schools of Portland, Ore. In 1891 Miss Sabin became president of Downer College, Fox Lake, Wis., and from 1895 to 1921 was president of Milwaukee-Downer College. At the Columbian Exposition at Chicago in 1893 Miss Sabin was juror of the educational exhibit and from 1886 to 1892 was member of the National Council of Education.

SABIN, Joseph, American bibliophile: b. Braunston, Northamptonshire, England, 9 Dec. 1821; d. Brooklyn, N. Y., 5 June 1881. After apprenticeship to Charles Richards, bookseller of Oxford, he set up a bookshop of his own there, but in 1848 came to this country, where he conducted establishments for the sale of old and rare works in New York 1850–56, in Philadelphia 1856–60, and New York 1860–81. His bibliographical knowledge was wide, and he is said to have crossed the Atlantic not less than 25 times for the purchase of unique specimens. From 1869 he published for a number of years *The American Bibliopolist.* He also prepared several compilations, among them 13 volumes of an uncompleted 'Dictionary of Books relating to America.'

SABINE, Sir Edward, English physicist: b. Dublin, Ireland, 14 Oct. 1788; d. Richmond, Surrey, 26 June 1883. He was educated at the military colleges of Marlow and Woolwich and in 1803 entered the army where he was commissioned 2d lieutenant of artillery. He served in the war with the United States in 1813–14 and accompanied Ross and Parry in their Arctic expedition in 1818 and that of Parry in 1819–20. While on these expeditions he engaged in researches in terrestrial magnetism and in 1821–25 conducted a series of voyages extending from the Arctic regions to the equator, gathering data concerning the magnetic needle, the figure of the earth and other points in meteorological and terrestrial physics. He was instrumental in the establishment of permanent magnetical and meteorological observatories, retaining directorship of those in the colonies for many years. In 1818 he was elected to the Royal Society, was its vice-president in 1850 and in 1861–71 acted as its president. He received rank as lieutenant-general in the army in 1859 and was retired with full rank as general in 1874. His works include 'An Account of the Experiments to determine the Figure of the Earth' (1825); 'The Variability of the Intensity of Magnetism upon Many Parts of the Globe' (1838), etc.

SABINE, Lorenzo, American historian: b. New Lisbon, N. H., 28 Feb. 1803; d. Boston, Mass., 14 April 1877. He sat in the New Hampshire legislature for three successive terms, but removed to Massachusetts in 1849, and was a Whig member of Congress in 1852–53. He is best known for his important work on 'The American Loyalists, or Biographical Sketches of Adherents to the British Crown in the War of the Revolution' (1847). He also published 'Life of Preble' (1847); 'Reports on the Principal Fisheries of the American Seas' (1853); 'Notes on Duels and Duelling, with a Preliminary Historical Essay' (1856), etc.

SABINE, Wallace Clement, American physicist: b. 13 June 1868; d. 10 Jan. 1919. He was graduated at Ohio University in 1886 and at Harvard in 1888. He was, until he died, connected with the faculty at Harvard, was professor of physics there in 1905–14, and after 1914 Hollis professor of mathematics. He was agrégé professor at the University of Paris in 1916–17. Author of 'Architectural Acoustics' (1900).

SABINE, a river of the United States, which has its rise in the northeastern part of Texas, in Hunt County, flows southeast about 250 miles, then turns southward and forms the boundary between Texas and Louisiana, and enters the Gulf of Mexico through Sabine Lake and Sabine Pass. It is approximately 550 miles long and has a drainage area of about 10,400 square miles.

The Sabine River is part of the Sabine-Neches Waterway, which is a consolidation of the improvements of the harbor at Sabine Pass, the Port Arthur Canal, the Sabine-Neches Canal, including the Sabine River to Orange (Tex.) and the Neches River to Beaumont (Tex.). Sabine Pass is the mouth of Sabine River. It is on the Gulf of Mexico 80 miles east of Galveston and 435 miles west of New Orleans. It is about seven miles long and from 1,700 to 5,000 feet wide. It connects Sabine Lake with the Gulf of Mexico. Both Sabine Pass and Sabine River have been improved by the Federal government (with local co-operation) at great expense, the original project for the improvement of Sabine Pass having been adopted by Congress in 1875, modifications and new projects following in subsequent years. Jetties, wharves and other terminal facilities have been built, and channels deepened and widened to admit deep-draft ocean-going vessels, with the result that a very large commerce has developed, principally in crude and refined petroleum, but also in lumber, grain, iron ore and sulphur.

SABINE CROSS ROADS, Battle of, and BANKS' RETREAT TO ALEXANDRIA. Three miles southeast of Mansfield, De Soto Parish, La., one of the main roads from Alexandria to Shreveport is crossed by a road from Red River to Sabine River. At this crossing was fought a battle which marked the culmination and failure of what is known as the Red River Expedition. On 23 Jan. 1864, General Banks, then at New Orleans, received a despatch from General Halleck, dated the 4th proposing an expedition, to consist of the forces of Banks, Steele and such as could be spared by Sherman, for the capture of Shreveport, La., on Red River, and the recovery of Texas, thus opening access to the cotton of that section and stimulating trade. Banks had, on a previous occasion, for sound reasons, objected to such a campaign, but now acquiesced and promised a cordial co-operation; but he set forth the difficulties in the way, and made suggestions to remove them, not one of which was regarded. Engrossed with duties concerning political affairs in Louisiana, which had specially been confided to him by the President, Banks could not immediately leave New Orleans, and he entrusted the arrangements of the expedition to Gen. W. B. Franklin, his second in command, who was to move from the Teche 5 March, reach Alexandria on the 17th, and co-operate with a strong fleet under command of Admiral Porter. Porter arrived at the mouth of Red River on 7 March, with

a fleet of 15 ironclads and four light steamers, and there he was joined some days later by transports from Vicksburg, carrying four divisions of Sherman's army, under Gen. A. J. Smith, and the Marine brigade of Colonel Ellet. A part of the plan of campaign was that General Steele, with an army of 15,000 men, should move from Little Rock, Ark., directly on Shreveport; but Steele, after marching from Little Rock to Camden, was checked, fell back to Little Rock and took no further part in the campaign. (See JENKINS' FERRY, BATTLE OF). Smith's forces advanced, attacked and in conjunction with the navy, 14 March, captured Fort de Russy, up Red River, together with 283 prisoners, 10 guns, and many small arms, the Confederate covering force of 3,500 men, under General Walker, after burning two steamboats and a considerable quantity of cotton, retreating up the river. It was not until the 19th that Franklin, with very little opposition, which was brushed aside by his cavalry, reached Alexandria. Banks joined him on the 24th, but his entire column did not close up until the 26th. Meanwhile General Mower, with three brigades of Smith's division and a cavalry brigade of the 19th corps, marched from Alexandria on the 21st for Henderson's Hill, 25 miles westward, surprised the 2d Louisiana cavalry, and with slight loss captured 250 men, nearly as many horses, and four guns, with their caissons. Near Alexandria the fleet came to a series of rapids, and the water was so low that the ironclads could not run up them, but after a week's hard labor the lighter ones were carried over. The transports, which could not pass, returned to Vicksburg, and with them Ellet's 3,000 men. The withdrawal of the transports made it necessary to establish a base at Alexandria and to use a wagon-train to carry the supplies, while it was also necessary to leave a guard of nearly 4,000 men (under General Grover) to protect the place. General Franklin, with the main column, advanced on the road running west of and parallel to the river, to Natchitoches, about 80 miles above Alexandria, driving before him the Confederate cavalry, and reaching Natchitoches on 3 April, where he was joined by A. J. Smith's column, which, accompanied by Porter's fleet, had come to Grand Ecore, four miles from Natchitoches. Porter had a fleet of 13 gunboats and 30 transports.

Banks' army, on the eve of march from Natchitoches for Shreveport, was composed of two divisions of the 13th corps, under Gen. T. E. G. Ransom; five brigades of the 16th corps, under Gen. A. J. Smith; Gen. W. H Emory's division, three brigades of the 19th corps; and Colonel Dickey's brigade of colored troops, under General Franklin; Gen. A. L. Lee's division of cavalry and mounted infantry, four brigades; and a small artillery reserve, under Captain Closson. These numbered 31 March 25,735 officers and men, with about 65 guns. Lee's cavalry force of 4,500 men had pushed out westward, 12 miles; on 2 April it ran across Confederate cavalry, drove it back eight miles, and then withdrew to wait for the general advance. This began on the morning of the 6th, led by Lee's cavalry, followed by the two small divisions of the 13th corps, under Ransom, and by Emory with a division of the 19th corps and Dickey's brigade of colored troops. On the morning of the 7th A. J. Smith followed with Mower's division of the 16th corps. A division of the 17th corps, 1,730 strong, under Gen. T. Kilby Smith, remained with the transports, under instructions to conduct them to Loggy Bayou, opposite Springfield, about midway between Natchitoches and Shreveport, 110 miles by the river, above Grand Ecore, where he was to halt and communicate with the army at Sabine Cross Roads, 54 miles from Grand Ecore. Porter, Smith and the transports, with six gunboats carrying 17 guns, started on the 7th.

Lee's instructions from General Franklin were to attack the enemy wherever found, but not to bring on a general engagement. On the 7th he drove a brigade of General Green's beyond Pleasant Hill, and came upon a strong force under Green at Wilson's Farm. Lee attacked and after a hard engagement of two hours drove Green to Saint Patrice's Bayou, eight miles from Pleasant Hill. Here Lee bivouacked for the night, and sent back for infantry support. His loss had been 53 killed and wounded. Green's loss was greater, including about 100 prisoners. That night Franklin reached Pleasant Hill; A. J. Smith's division was still a day's march in rear of Franklin. At daybreak of the 8th Lee, having been reinforced by one of Landram's brigades of the 13th corps, dropped his wagon-train, and, moving forward, drove the Confederates from Saint Patrice's Bayou and gradually pushed them to a wood beyond a clearing at Sabine Cross Roads, and found himself in the immediate front of Gen. R. Tayor's army of 10,000 men. Taylor, whose forces had been much scattered, in Arkansas, Louisiana, and Texas, had concentrated them, and near Mansfield had the three divisions of Generals Green, Walker and Mouton — 10,000 men. On the morning of the 8th he moved three miles from Mansfield to Sabine Cross Roads and formed line in the edge of a wood, commanding, on both sides of the road, a clearing about 1,200 yards long, and 800 wide, through the middle of which was a deep ravine. He knew that Banks' column was stretched out on a single road for more than 20 miles, and was sanguine of success in attacking the head of it. Lee threw out a strong skirmish-line and waited for Banks' main body to come up. At noon Ransom arrived with a brigade, and line was formed. Banks rode up a little past noon, and sent back repeated orders for Franklin to hurry forward. After heavy and continuous skirmishing, lasting until 4.30 P.M., Taylor threw his entire force of 10,000 men heavily upon the Union line; Mouton's division and two brigades of dismounted cavalry made an impetuous charge upon the Union right, in which Mouton was killed at the first onset, while Walker's division and a brigade on its right fell upon the centre and left of the line. For nearly an hour the men (not over 4,500) of Banks' command resisted this attack, and then were compelled to fall back to the woods in rear of the open space at the cross roads, with heavy loss, including three guns. Franklin had come up with Cameron's division of the 13th corps, and a new line was formed, to be immediately broken by heavy attacks on both flanks and front. The Confederates were gaining the rear, and the Union line was pressed back along the

narrow forest road filled with wagons and mules of the supply-train, stragglers, and camp-followers, which so blocked the way that an orderly retreat was impossible. Soon a panic set in, the cavalry train of 156 wagons was captured, Ransom's 10 guns were taken, along with 1,000 of his men; Franklin and Ransom were wounded, some of the best officers were struck down; and in spite of the heroic efforts of Banks and others to rally them, nearly the whole army broke into a disorderly retreat, which was checked only at Pleasant Grove, three miles from the field of battle. Here General Emory, with his division, had come up at 6 P.M., and formed line in the edge of a wood, on a ridge overlooking a small stream; and scarcely had his line been formed when the panic-stricken fugitives came rushing back through it to the rear. The Confederates were close on their heels, made an immediate assault upon Emory, and were met with a severe fire delivered at close quarters that instantly checked them. After an hour and a half of fierce battle, in which they made desperate efforts to turn Emory's right, the Confederates were everywhere repulsed with great loss, but held the shores of the stream. Banks' army, after having advanced to within two marches of Shreveport, had been saved from total destruction "by a triumph of valor and discipline on the part of a single division and of skill on the part of its intrepid commander." The action is known as the battle of Pleasant Grove. The Union loss at Sabine Cross Roads and Pleasant Grove was about 1,050 killed and wounded and nearly 1,800 missing; the Confederate loss, 1,500 killed and wounded.

Banks had been limited as to time in carrying out the objects of his campaign. General Sherman was calling for A. J. Smith's troops, and General Grant, who had set his heart on a movement by Banks from New Orleans on Mobile, had written him: "I had much rather that the Red River expedition had never been begun, than that you should be detained one day beyond the first day of May, in commencing the movement east of the Mississippi." The allotted time was fast expiring, Banks concluded to abandon his expedition. The night of the 8th he fell back 15 miles to Pleasant Hill, which was reached by Emory's division, that brought up the rear about 9 o'clock next morning. A. J. Smith, with a part of his command, had halted at Pleasant Hill, on the evening of the 8th, and with less than 13,000 men Banks formed a double line; the first, of the 19th corps, along a thickly wooded slope half a mile west of Pleasant Hill; the second, of A. J. Smith's command and the artillery, on a plateau in rear. The trains, preceded by Lee's cavalry and Dickey's brigade of colored troops, and followed by the remnants of Ransom's division, were put on the road to Grand Ecore. General Taylor, reinforced by the divisions of Generals Churchill and Parsons, had followed Banks very cautiously, and at noon his advance appeared and began skirmishing. Later artillery was brought up and opened fire, and a demonstration was made on the Union right. About 5 P.M. three Confederate divisions charged out of the woods upon the left flank of the Union line, which was steadily driven back up the hill to the cover of the second line. Here the Confederates were repulsed with great loss. Meanwhile the right of the Union line, though hard pressed, stood firm until, the left being driven back, it was nearly enveloped and gave ground, and the Confederates pressed on to an attack on A. J. Smith, who held the second line in reserve. After a short and sharp exchange of fire, Smith's and part of Emory's men made a charge and pushed back the Confederate line. All the reserves were now thrown into action, and the Confederates were routed, driven from the field and pursued until dark. Gen. E. Kirby Smith, the Confederate department commander, says: "Our troops attacked with vigor and at first with success, but, exposing their right flank, were finally repulsed and thrown into confusion. The Missouri and Arkansas troops, with a brigade of Walker's division, were broken and scattered. The enemy recovered cannon which we had captured the day before, and two of our pieces with the dead and wounded were left on the field. Our troops were completely paralyzed and disorganized by the repulse. . . . Our repulse at Pleasant Hill was so complete and our command was so disorganized that had Banks followed up his success vigorously he would have met but feeble opposition to his advance on Shreveport."

Banks had at Pleasant Hill 12,600 men, of whom 150 were killed, 844 wounded and 375 missing. Taylor had 14,300 engaged, of whom about 1,000 were killed and wounded, and nearly 500 missing.

Encouraged by his success at Pleasant Hill, Banks gave orders for a forward movement next morning on Shreveport, and preparations were being made for the march, when General Franklin and other officers dissuaded him from it, and it was decided to fall back to Grand Ecore and unite with the fleet. The retreat was resumed during the night and Grand Ecore reached on the 11th. E. Kirby Smith joined Taylor after the close of the battle of Pleasant Hill, and determined to move against General Steele in Arkansas. Taylor withdrew his infantry to Mansfield on the 10th and 11th, leaving the cavalry, under Green, and Polignac's infantry division of 2,000 men to watch and harass Banks. Upon his arrival at Grand Ecore, Banks intrenched, threw a pontoon-bridge across the river, put part of his force on the other side and waited for the fleet to come down. Porter, with the gunboats and Kilby Smith, with the transports, had arrived at Loggy Bayou on the afternoon of the 10th, where, two hours later, they received news of Banks' misfortunes, and on the morning of the 11th received his orders to return to Grand Ecore. The fleet turned down stream, but it was not to reach Grand Ecore without opposition. On the evening of the 11th Green, who had been left at Pleasant Hill, started with 750 men and two batteries for Blair's Landing, and on the 12th, with about 500 men and three guns, attacked the fleet and transports as they were running down the river. A brisk fight followed, General Green was killed by a discharge of grape from one of the gunboats and his men were driven off, with small loss. The Union loss was 57 killed and wounded. By the 15th all the gunboats were back to Grand Ecore, and as fast as the vessels could pass the bar they made their way to Alexandria, one

gunboat being lost. The fleet having passed down, Banks marched from Grand Ecore on the 22d for Alexandria, and that night bivouacked at Clouterville, 32 miles from Grand Ecore. The march was resumed on the 22d, and on the morning of the 23d, while marching along Cane River, a branch of the Red, the head of the column was checked at Monett's Ferry by General Bee, with four brigades of 2,000 men and four batteries. Bee's position was a strong one on a bluff commanding the crossing, and on the only practicable road to Alexandria, 35 miles distant. At the same time the Confederate cavalry under General Wharton and Polignac's infantry were harassing Banks' rear. General Birge, with his own brigade and Cameron's division of the 13th corps, in all about 5,000 men, crossed Cane River three miles above the ferry, and by a difficult flank march of several miles reached a hill, the occupation of which rendered Monett's Bluff untenable. Birge attacked at 2 P.M., after a contest of two hours carried the hill, and the Confederates retreated and left open the road to Alexandria. The Union loss was 150 to 200 killed and wounded. Banks resumed his march on the 24th, and without further serious opposition entered Alexandria on the 25th. Banks reported that in the 24 days intervening between the march of the army from Alexandria and its return there his own army had marched 400 miles. He had fought several battles, and been successful in all but one, and his losses were 289 killed, 1,541 wounded and 2,150 missing, an aggregate of 3,980. The difficulty of getting Porter's fleet over the shallow rapids near Alexandria detained Banks at that place until 13 May, when he continued his retreat. (See YELLOW BAYOU, ENGAGEMENT AT). Consult 'Official Records' (Vol. XXXIV); Taylor, 'Destruction and Reconstruction'; The Century Company's 'Battles and Leaders of the Civil War' (Vol. IV).

E. A. CARMAN.

SABINE MOUNTAINS, Italy, a branch of the Apennines, near the border of ancient Latium, east of Rome, is a lofty group in the upper valley of the Aternus; the highest summit reaches an altitude of about 4,200 feet.

SABINE PASS, Engagement at. On 6 Aug. 1863 General Halleck informed General Banks, in command at New Orleans, that there were important reasons why the United States' flag should be raised at some point in Texas, with the least possible delay. Halleck's dispatch was by direction of the Secretary of War, and it was understood that the proposed movement was of diplomatic rather than a military character, and intended to prevent European complications. Banks was left to his own judgment how to conduct the campaign, but it was suggested that the most feasible route would be by the Red River to Shreveport. Banks, deeming the Red River route impracticable at that season of the year, fitted out an expedition to make a lodgment in Texas at Sabine City, on Sabine Pass, the outlet from Sabine Lake into the Gulf of Mexico, and the terminus of a railroad penetrating eastern Texas, and making connection with Houston, the capital of the State. General Franklin was put in charge of the advance of the expedition of 5,000 men, and was instructed to land a few miles below Sabine Pass, move upon the Confederate works commanding it, and, if practicable, to seize Beaumont, on the railroad to Houston. Four light-draft gunboats, under command of Lieutenant Crocker, formed part of the expedition, which sailed from New Orleans on 4 September. Franklin disregarded his instructions to land 10 or 12 miles below Sabine Pass, and on Crocker's representation that he could silence the Confederate works in the pass, he and Crocker arranged for the gunboats to make a direct attack upon the works, drive out the garrison, seize or drive away two Confederate gunboats reported on the river and then land the troops. From the army 150 sharpshooters were distributed on the four gunboats. Early in the forenoon of the eighth the gunboats and transports crossed the bar at Sabine Pass, and in the middle of the afternoon three of the gunboats opened fire upon the small fort, mounting eight heavy guns, and held by 44 officers and men. The fire was immediately returned, two of the gunboats were disabled and surrendered and were taken in tow by two small Confederate craft. It was all over in less than an hour. Franklin made no serious attempt to land his troops, but immediately returned to New Orleans, having lost two gunboats, with their 15 heavy guns, nearly 50 killed and wounded and over 200 prisoners, among them Lieutenant Crocker, of the navy. Not a Confederate was hurt. Consult 'Official Records' (Vol. XXVI).

SABINES, sā'bīnz (Lat. SABINI, sa-bī'nī), a people noted in the early history of Rome, whose territory they adjoined. The Sabines were engaged in agriculture and grazing, and from the simplicity of their lives and their physical prowess they obtained a reputation like that of the Spartans for severity of discipline and sturdiness of character. The narrow limits of the Sabine territory made emigration necessary, and probably in this way they came in contact with the growing power of Rome. They fought the Romans with great courage, but were subdued about 290 B.C., and admitted to Roman citizenship, but not permitted to vote in civic affairs. They became merged in the republic and subsequent empire, and were lost to view as a separate people.

SABINUS, Masurius, Roman jurist. He flourished during the reign of Tiberius, and was a pupil of Capito. He was the founder of the school of Sabiniani, and was the author of several works much used and commented upon by later jurists, the most important being 'Libri iii, Juris Civilis,' which is not now extant.

SABLE, one of the fur-bearing animals (*Mustela zibellina*), found in Siberia, Asiatic Russia and Kamchatka, or its American representative (*M. americana*) which differs so little that it is doubtfully named as a separate species. The average length of the sable is about 18 inches, excluding the tail, which is somewhat bushy. The body partakes of the form of the weasels generally, in that it is elongated and vermiform. The fur is smooth, glossy and may be pressed or smoothed in any direction, owing to the mode of attachment of the hairs to the skin. In color it is a rich deep brown, which near the head may exhibit white markings, and frequently assumes a gray tint about the neck. The fur is heaviest during winter, and the dan-

gers experienced by the sable-hunters from sudden snow-storms obliterating the track, or from the inclement cold, can hardly be over-estimated. Sables are for the most part captured in traps, but are cautious animals, and their pursuit is attended with much difficulty. They make their homes in dens or cavities in hollow trees, and produce from three to five young at a birth, the young being born in March or April; and their general habits are those of the marten and weasel, but they are more shy and retiring.

Skins of the Russian sable fetch prices in Liverpool ranging from 3 to 10 guineas. The darkest skins are considered to be the finest. About 2,000 skins annually find their way to England. Most of these furs are used in Russia, where about 25,000 are said to be annually collected. When manufactured for linings sable fur may fetch prices as high as 1,000 guineas. The corporation robes of the London aldermen are lined with this expensive material, and the tails of sables are used in the manufacture of artists' brushes. See also Fur-Bearing Animals; Fur Trade.

SABLE, Cape, Florida, the southernmost extremity of the Florida peninsula, in Monroe County, and the southernmost point of the United States, in latitude 25° 7′ N. and longitude 81° 9′ W.

SABLE ANTELOPE, one of the largest and most handsome of African antelopes (*Egoceros niger*), of the same genus as the roan antelope, blaubok and others, and like them rapidly approaching extinction, as civilization more and more encroaches upon the plains of southern and eastern Africa. Its coat is a deep glossy black, markings upon the face, the buttock and the under parts being white. The great-ringed horns sweep back from the forehead in a sabre-like curve, and the neck is adorned with a mane. These antelopes went about, in old times, in herds, and were prizes for the sportsmen, while their flesh was excellent to eat. They are approaching extinction.

SABLE ISLAND, a low-lying island in the Atlantic, off Nova Scotia, in latitude 43° 55′ N. and longitude 60° W., 95 miles southeast of Cape Canso. It is a chain of sand dunes enclosing a lagoon, and is such a menace to navigation that the government of Canada maintained two lighthouses there until 1948 when one was dismantled. It has been called the graveyard of the Atlantic. It was formerly 40 miles long and is now but 20, gradually sinking. Upon its sandy ridges grow cranberries and wild grass, and attempts are being made to raise pines and other hardy evergreens. There are sandbanks in the vicinity. The only inhabitants are the lighthouse and lifeboat men attached to the life-saving station for the relief of shipwrecked persons. The island is known for its breed of hardy wild ponies.

SABOTAGE, săb-ō-täzh (Fr. sà-bō-tàzh), a term of French origin used both as substantive and verb to denote the deliberate waste or destruction of an employer's property, as goods in process of manufacture or manufacturing machinery; also the refusal to perform assigned work and obstruction in all possible ways of the regular process of production. During labor troubles workmen sometimes resort to sabotage as a means of putting pressure on their employers to enforce their demands. In England during the early years of the Industrial Revolution home weavers seeing their livelihood threatened by the rapid spread of the factory system often sabotaged the newly introduced power-operated machinery. In more recent times the introduction of labor-saving improvements in machinery and manufacturing methods with consequent curtailment of the working force has frequently led to acts of sabotage on the part of workers fearing a further reduction of employment. The rapid growth of labor unions in the late 19th and early 20th centuries, on the whole, reduced the amount of sabotage in industry; for the well organized and highly disciplined labor organizations of all highly industrialized countries have realized their responsibility, shared with management, to keep the wheels of industry operating, if at all possible, during negotiation of disputes, and also to keep means of production unimpaired during periods of strikes or lockouts. Sabotage has also been frequently used as an effective political weapon against an unpopular regime, as the Germans discovered in the countries occupied in World War II.

SABOTS, sà-bō′ (called also Getas) wooden shoes largely worn by the peasantry of France, Belgium, Holland and some other parts of Europe. They are especially useful in wet weather, and in moist places generally, being well adapted to preserve the feet from damp. Great numbers of sabots have been exported by France to Belgium. In some parts of England, as in Lancashire, shoes with thick wooden soles, but with leather vamps or "uppers," are worn by most of the artisan class. See also Boots and Shoes.

SABRE- or SABER-TOOTHED TIGERS, extinct cats of the family Machaerodontidae (or Nimravidae), a group whose remains occur as fossils from the Eocene up to the Pleistocene. They differ from ordinary cats (Felidae) in several anatomical features, having some peculiarities which ally them to the bears, and others recalling existing viverroids, as the foussa (*Cryptoprocta*). They are remarkable for the character of the dentition, which in the earlier genera comes near showing the complete number of teeth, but displays a steady tendency as the family history is followed toward the reduced number possessed by existing cats. At the same time the dentition is often distinguished by the huge size of the upper canines, which in some cases were five or six times as long as the neighboring teeth, and have been justly called "sabre-teeth." These tushes reached their highest development in the genus *Machaeodus,* whose species were of very wide distribution, occurring in both North and South America and in Europe. These carnivores were of various sizes, up to dimensions equal to those of modern tigers, and so little different in general from true cats that Cope places them within the Felidae. It began in the Eocene and continued down almost or quite to the Glacial Period, when the type seems to have become extinct because the great canines had overgrown their usefulness and become a hindrance instead of a help in getting a living. They finally became so large that the animal could not open its mouth wide enough to make use of them in biting, and the space be-

tween them would admit none but a very small piece of meat to enter, even if a large piece could be torn away. "Even when the mouth opens so far as to allow the mandible to pass behind the apices of the canines," remarks Cope, "there would appear to be some risk of the latter being caught on the point of one or the other canine, and forced to remain open, causing early starvation." Other prominent genera in the family are the plantigrade *Dinictis; Nimravus* and *Pogonodon,* with species as large as panthers; and *Hoplophoneus,* with dentition like modern cats.

SAC AND FOX INDIANS, an Algonquian people called by the French, Foxes (*Renards*), possibly because of their having a Fox clan. To themselves they were Muskwaki or red-earth people. When first noticed by the whites they inhabited central Wisconsin. The Ojibwas had driven them from the Lake Superior region and about 1760, being worsted in conflict with the French, they incorporated with the Sac tribe, with whom they have remained so intimately connected as to have been long regarded as one tribe. They are of the woodland type, formerly lived in bark houses and cultivated corn and vegetables. They developed a complex social organization and are noted for their conservativeness in adopting the customs of the whites. Their number at present is about 750.

Consult Owen, M. A., *Folk-lore of the Musquakie Indians of North America* (London 1904); Smithsonian Institution, Bureau of American Ethnology, *Handbook of American Indians* (Washington, D.C., 1907); Jones, W., *Ethnography of the Fox Indians,* Bulletin 125, Bureau of American Ethnology (Washington, D.C., 1939).

SAC CITY, city, Iowa, and Sac County seat; altitude 1,278 feet; on the north fork of the Raccoon River; and 94 miles southeast of Sioux City. It is served by the Chicago and North Western; and the Chicago, Milwaukee, St. Paul and Pacific railroads; and state and federal highways. Situated in a stock and grain farming region, it has allied industries, including sweet corn canneries. The city has a public library; a scenic tourist park; and the Sac-Fox Indian burial grounds are nearby. Government is by mayor and council. Pop. (1950) 3,170.

SAC FUNGI. See FUNGI.

SACAGAWEA, săk-ă-gă-wē'ă, **SACAJAWEA,** or **SAHCARGARWEAH** (Minnetarre name *Tsa-ka-ka-wias,* "BIRD WOMAN"; Shoshone name *Bo-i-naiv,* "GRASS MAIDEN"), American Indian guide of the Shoshone tribe, the only woman to accompany the Lewis and Clark Expedition of 1804–1806: b. about 1784; d. Shoshone Agency, Wyo., April 9, 1884. She was betrothed in infancy according to tribal custom, but was captured by the Minnetarres when a child and later gambled away by her captor to a Frenchman named Toussaint Charbonneau, whose wife she became and with whom she was living in the Dakotas when Lewis and Clark reached there. Charbonneau and Sacagawea were engaged as guides and spent the winter at Fort Mandan, where Sacagawea's son, Baptiste, was born Feb. 11, 1805. Sacagawea displayed remarkable ability as a guide, threading the way accurately to her own country which she had not seen since she was a child, and gaining the admiration of the expedition for her courage and resourcefulness. On one occasion at the risk of her life she rescued from an overturned canoe the records of the expedition and other light articles of great value to the explorers. She led the party to the camps of her own people Aug. 17, 1805, where she was immediately recognized, her affecting meeting with her brother Cameahwait, chief of the tribe, being described in the journals kept by Lewis and Clark. She was claimed by her betrothed husband, who, however, relinquished his claims upon finding her the wife of another and mother of a son whom she had carried on her back all the way. Here the devotion of the Indian woman procured for the white men food and horses from the Indians, while her shrewd sense and good counsels prevailed over her brother's determination to destroy the whites for the sake of their goods. Finding all her people dead except her brother and the child of a dead sister she immediately adopted the sister's child as her own, and according to the custom of her people never admitted the sister's son to be other than her own. This child, of pure Indian blood, was known as Basil; both children lived and had descendants. Sacagawea accompanied the party to the ocean, which was reached Nov. 7, 1805, and returned with Captain Clark by way of the Yellowstone, which region also she knew well. Upon their return to the Minnetarre country Charbonneau refused all inducements to accompany the explorers to civilization, and Sacagawea remained with him. Further mention is made of her and her son Baptiste in Clark's letters, but she then disappears until she was found, an old woman, in the Shoshone Agency. She told a clear and intelligible story, and although illiterate spoke excellent French, which, however, she spoke with less ease in the earlier days of the expedition. She died when about 100 years old. Monuments have been erected to her at Portland, Ore.; Bismarck, N. Dak., and by the State of Wyoming.

Consult "Sacajawea" in *Journal of American History* (September 1907); Thwaites, J. G., *Journals of Lewis and Clark Expedition,* 8 vols. (1904); Schultz, J. W., *Bird Woman* (1918).

SACALAIT, săk'ă-lā, a fish. See CRAPPIE.

SACATON GRASS. See GRASSES IN THE UNITED STATES—*Sporobolus.*

SACBUT, or **SACKBUT,** the word by which translators have rendered the *sabbeka* of the Hebrew Scriptures. The exact form of the sabbeka has been much disputed, but that it was a stringed instrument is certain, for the name passed over into Greek and Latin in the forms *sambukē, sambuca,* and the instrument so called is described by Athenaeus as a harplike instrument of four or more strings, and of a triangular form. It is not unlikely that this instrument was introduced among the Jews from the East, since one of the musical instruments most frequently occurring in the Assyrian sculptures answers very closely to this description, and may perhaps be identified with the sabbeka, the name of which is, besides, Chaldaic. Nothing resembling this Assyrian instrument is to be found on the Egyptian monuments or in the sculptures of Greece and Rome. Since the sabbeka was a stringed instrument the rendering sacbut is altogether wrong, since that was, at the time when our translation of the Scriptures was made, the name of a wind instrument now called the trombone. See TROMBONE.

SACCHARIN, săk'ka-rĭn, benzoïc sulphinide, $C_6H_4\langle^{CO}_{SO_2}\rangle NH$, has attained commercial importance and is manufactured on a large scale in many countries on account of its intense sweet taste, chemically pure saccharin being 500 times sweeter than cane sugar. The compound was discovered in 1879 by I. Remsen and C. Fahberg during an investigation of the oxidation products of toluene sulphone amide.

Some of its salts possess the intense sweet taste of the original compound. The sodium salt, $C_6H_4\langle^{CO}_{SO_2}\rangle NNa.2H_2O$, is the commercial "crystallose," 400 times sweeter than cane sugar, and being very soluble in water is extensively used as a sweetening medium in preference to the less soluble saccharin.

SACCO-VANZETTI CASE, The, an American *cause célèbre* which excited worldwide controversy due to a general belief that the defendants had been charged with a crime of which they were innocent, and had been convicted not upon the evidence but by reason of popular prejudice against persons holding heterodox political, social and religious views. During the winter of 1919–1920 a wave of antiradicalism swept the United States. Russian bolshevism had started its westward march, and the American press played up the machinations of the "Reds." In Massachusetts a number of Italians professing the philosophical anarchy of Luigi Galleani were imprisoned or deported. At the height of this antiradical campaign, the paymaster and guard of a shoe factory were killed on April 15, 1920, on the main street of South Braintree, Mass., and robbed of $16,000. On May 5 the police arrested two Italians, Nicola Sacco (b. 1891) and Bartolomeo Vanzetti (b. 1888), charging them with the crime. Both had emigrated to the United States in 1908. Sacco, when arrested, had been working for 11 years in a shoe factory at Milford, Mass., except for a year's absence in Mexico to avoid the World War I draft. His employers considered him an honest and dependable worker. Vanzetti had been a fish peddler since 1915. Their joint trial began May 31, 1921 at Dedham, before Judge Webster Thayer. No money was traced to them, nor was any evidence adduced to prove they had ever possessed the automobile in which the murderers escaped. The prosecution relied on two main points: (1) identification by eye witnesses; (2) the fact that on their arrest the men had made false statements to the police as to their movements on the day of the crime. But the defense presented evidence of the defendants and many witnesses placing them elsewhere when the crime was committed. As to the false statements, these were freely acknowledged and attributed to fear of imprisonment and deportation as radicals. On July 14, both were found guilty of first degree murder. Applications for a re-hearing were denied and the state supreme court refused to intervene. Meanwhile the confession of a condemned criminal in 1925 led to the discovery of corroborative evidence pointing to the likelihood that the murder had been committed by a bandit gang from Providence, R. I. Petitions for release of the accused were received from all over the world, and protests from such famous European intellectuals as Romain Rolland, Anatole France, Mazaryk and Einstein. But Massachusetts public opinion remained hostile to the defendants. New Englanders of the Puritan tradition regarded them as alien agitators, while the new Roman Catholic element hated them as apostates. For once these discordant groups united in resentment against "interfering outsiders." The death sentence was imposed on April 9, 1927. But increasing criticism both at home and abroad led Gov. Alvan T. Fuller to appoint an advisory committee consisting of a former probate judge and the presidents of Harvard and Massachusetts Institute of Technology to study the conduct of the trial. On August 3 the governor announced that he and the committee were unanimous in finding the trial fair and defendants guilty. Both defendants, protesting their innocence, were executed Aug. 23, 1927.

SACCOPHARYNX, a genus of *Muraenidoe,* with a single species (*S. flagellum*), a deep sea conger eel, of which only three specimens have been observed; muscular system very feebly developed; bones thin and soft, wanting in organic matter; head and gape enormous; stomach distensible in an extraordinary degree; vent at end of trunk. The specimens known have been found floating on the surface of the North Atlantic with their stomachs much distended, having swallowed some other fish many times their own weight. They attain a length of several feet. See also Deep Sea Exploration.

SACHEVERELL, să-shĕv'ë-rĕl, **Henry,** English Anglican divine: b. Wiltshire, about 1674; d. London, June 5, 1724. He was educated at Oxford and in 1705 was appointed preacher of Saint Saviour's, Southwark. While in this station he, in 1709, preached two famous sermons, the object of which was to rouse apprehensions for the safety of the church and to excite hostility against the Dissenters. Being impeached in the House of Commons he was brought to trial in February 1710, and on March 23, when the trial was concluded, was suspended from preaching for three years. This prosecution, however, excited such a spirit in the High Church party that it helped to overthrow the ministry of Godolphin, and established the fortune of Sacheverell, who, during his suspension, made a kind of triumphal progress through the kingdom. The same month that his suspension terminated (1713) he was appointed to the valuable rectory of Saint Andrew's, Holborn, by Queen Anne. Of the offending sermons 40,000 copies at least were sold, and of the record of the trial 30,000. Little was heard of Sacheverell after this party ebullition subsided, except through his numerous squabbles with his parishioners. His abilities, even according to writers on his own side, were very slight. Consult Stanhope, *History of Queen Anne's Reign* (1872).

SACHEVERELL, William, English Whig parliamentarian: b. 1638; d. Barton, Nottinghamshire, Oct. 9, 1691. He entered Parliament for Derbyshire in 1670 and bitterly opposed court policy, especially the secret treaty with France. A leader in investigating the "Popish Plot" and impeachment of Lord Arundel and the five popish lords (1678), he first suggested the Exclusion Bill to deny James the succession. Speaker Onslow called him the "ablest parliament man of Charles II's reign." See sketch in *The Dictionary of National Biography* by Sir George R. Sitwell.

SACHS, Edwin O., English architect: b. London, April 5, 1870; d. Sept. 9, 1919. Educated at University College School, London, and at the University of Berlin, engaging as an architect in London in 1892. In 1898, he applied electrical power to the working of the theatrical stage for the first time in England. Founded the British Fire Prevention Committee (1897) and organized the first International Fire Prevention Congress in London (1903) and the Special Fire Survey Force during World War I. Author of several works on theater construction and fire prevention.

SACHS, zäks, **Hans,** German meistersinger: b. Nürnberg 1494; d. there, 1576. By trade a shoemaker, he followed his business and made verses with equal assiduity. From about 1510 to 1515, he traveled over Germany practising his craft and studying the art of Meistergesang. Returning home, he became a master in his guild. He attached himself to the Reformation movement, to the spread of which he contributed not a little by a poem written in 1523 (*The Nightingale of Wittenberg*) in which he voiced his approval of Luther's cause. Sachs' literary productions total more than 6,000. Three volumes of his poems were published during his lifetime, and two more after his death. In the 17th and 18th centuries his works were neglected until Goethe drew attention to his merit in a poem published in the *Deutscher Merkur* (April 1776). In the 19th century, Sachs was used by Wagner as the prototype of one of his principal characters in *Die Meistersinger von Nürnberg.* Sachs' poems, notwithstanding a rudeness of language, are distinguished for striking description, feeling, invention, and wit.

SACHS, Julius von, German botanist: b. Breslau, Oct. 2, 1832; d. Wurtzburg, May 29, 1897. After attaining a full professorship at Freiburg in 1867, he established his own laboratory in Wurtzburg adding greatly to knowledge of the physiology of plants, the influence of light and heat upon them, and similar matters resulting from his experiments. He wrote *Lehrbuch der Botanik* (1868); and *Geschichte der Botanik* (1875).

SACHSENSPIEGEL, zäk'sĕn-shpē'gĕl, a collection of Saxon legal precepts and customs, written in the early 1200's in Latin and attributed to Eike von Repgow, a Saxon jurist. It had the force of law in some parts of Germany during the Middle Ages.

SACKBUT. See Sacbut.

SACKEN. See Bugonia Myth.

SACKETS HARBOR, village, New York, located in Jefferson County on the Black River Bay of Lake Ontario. It is largely a summer resort; the altitude is 246 feet. The village was settled about 1801. In 1809, the *Oneida,* the first of several United States war vessels built there, was launched; and in the War of 1812, it was an important naval station. Sackets Harbor Battleground, the site of an engagement during that war, is now a state park. Gen. Zebulon M. Pike is buried in the Military Cemetery. The Pickering-Beach Historical Museum contains relics of the early families of the area. Pop. (1940) 1,962; (1950) 1,240.

SACKETS HARBOR, Attacks on. At the outbreak of the War of 1812, the United States had troops at Sackets Harbor but only one ship on Lake Ontario, the *Oneida,* commanded by Lieut. Melancthon T. Woolsey. On July 19, 1812, Woolsey sighted a British fleet. He anchored his vessel where his guns could rake the entrance to the harbor, and mounted others on a bluff. After an hour's fight, the British withdrew. On May 29, 1813, a second attack was made by the British when Sackets Harbor was without naval defense. Its garrison numbered about 650, many of whom had no war experience. The British landed troops, but were finally halted by desperate resistance. However, during the battle and believing it lost, a naval lieutenant set fire to military stores. During the conflagration, the British retired with a loss of 259 in killed, wounded, and missing. On May 19, 1814, the British blockaded the harbor to prevent the exit of American frigates then under construction there, and sent 180 men to capture Woolsey and his men who were attempting to evade the blockade and bring back supplies from Oswego Falls by a water and land route. The Americans ambushed the British, capturing them and their boats, and on June 6 the British blockade was raised.

SACKVILLE, săk'vĭl, **Charles,** 6th Earl of Dorset and Earl of Middlesex, English courtier and poet: b. Jan. 24, 1638; d. Bath, Jan. 29, 1706. He became a wit and roisterer in the company of Charles II, and served under the duke of York in a naval engagement with the Dutch in 1665. He succeeded to the earldom in 1667, but was not in favor with James II and later became an ardent supporter of William of Orange, and was lord chamberlain of the household for several years following William's death. On the night before the naval engagement already referred to, he is said to have written or retouched his famous song, *To all you ladies now on land.* Little of his poetry is preserved. He was a patron of such poets as Prior and Wycherley, and Dryden dedicated to him the *Dialogue on Dramatic Poesy.* His only son, Lionel Cranfield Sackville, was made duke of Dorset in 1720.

SACKVILLE, Thomas, 1st Earl of Dorset and Baron Buckhurst, English statesman and poet: b. Withyham parish, Sussex, 1536; d. London, April 19, 1608. He became a student of the Inner Temple and was later called to the bar. In the Temple he wrote the last two acts of *The Tragedy of Gorboduc,* first English tragedy in blank verse, produced in 1561. Of a long poem, conceived by him and intended to comprehend a view of illustrious but unfortunate characters in English history, entitled *A Mirror for Magistrates,* he contributed only a poetical preface (the *Induction,* called by Sidney Lee the greatest English poem between *Canterbury Tales* and *The Faerie Queene*), and *Complaint of the Duke of Buckingham.* The work was completed by George Ferrers and Richard Baldwin (1559–1563). From 1558 to 1563, Sackville sat in Parliaments of Queen Mary and Queen Elizabeth. He was knighted and raised to the peerage in 1567. Between that time and 1598, he carried out a number of delicate missions at home and in foreign countries, and in 1599 was rewarded by the office of lord high treasurer, confirmed as a lifetime post by James I. In 1604, he was

created earl of Dorset. He ranks among the most prudent and able of the ministers of Elizabeth.

SACKVILLE, town, New Brunswick, Canada, in Westmorland County, 24 miles southeast of Moncton, on the Canadian National Railway. Mount Allison University is there. Plastics and machinery are manufactured. Pop. (1951) 2,873.

SACKVILLE-WEST, Sir Lionel Sackville, 2nd Baron Sackville of Knole, English diplomat: b. Cambridgeshire, July 19, 1827; d. Sevenoaks, Sept. 3, 1908. He entered the diplomatic service in 1847, was secretary of legation at Turin, Madrid, Berlin, and Paris; and envoy extraordinary and minister plenipotentiary to the Argentine Confederation (1872–1878) and to Spain (1878–1881). Appointed minister to the United States, and helped to negotiate the fisheries treaty of 1888. In October of that year, he received a letter from one who, representing himself as an Englishman naturalized in the United States, asked for voting advice in the ensuing presidential election. The minister advised his correspondent to vote the Democratic ticket as favorable to English interests. Sackville's recall was at once asked for; and, in default of prompt compliance, the Department of State sent him his passports.

SACKVILLE-WEST, Victoria Mary, English poet and novelist: b. Knole, Sevenoaks, England, March 1892, daughter of 3rd Baron Sackville, in the ancestral mansion presented to Thomas Sackville by Queen Elizabeth. In 1913 she married Harold Nicholson, journalist and diplomat. She first gained attention by her novel *Heritage* (1919) and a short story, *The Heir* (1922). Her most famous novels are probably *The Edwardians* (1930), and *All Passion Spent* (1931). She is author of a number of nonfictional works including *Knole and the Sackvilles* (1922), an account of her home and her family; *Passenger to Teheran* (1926), a story of some of her travels; *Country Notes* (1939) and *Country Notes in Wartime* (1940). *Pepita* (1937) tells the story of her maternal grandmother who was a Spanish dancer. Among her best known poems are *The Land* (1926) for which she was awarded the Hawthorndon Prize, and *The Garden* (1946) which gained her the Heinemann Prize. Her *Collected Poems* were published in 1932; *Another World Than This,* an anthology coedited with her husband, appeared in 1945; and *Nursery Rhymes* in 1947.

SACO, sä'kō, **José Antonio,** Cuban historian and publicist; b. Bayamo, Cuba, May 7, 1797; d. Madrid, Spain, Sept. 26, 1879. He was educated in Havana, and appointed professor of philosophy in the Seminary of San Carlos in 1821. He edited (1832–1834) the *Revista Bimestre Cubana,* but his liberal views caused his banishment, temporarily. After travels in Europe he resided in Paris for many years. He was elected a delegate to Madrid in 1866 to advocate political reforms for Cuba, and in 1878 was elected to the Spanish Cortes. His works include studies of slavery and of colonial government.

SACO, sâ'kō, city, Maine, in York County, altitude 60 feet; on the Saco River, opposite Biddeford, with which it is connected by bridges; on the Boston and Maine Railroad, and a federal highway. Largely residential, but produces textiles, textile machinery, and shoes, and has a considerable shipping business. The city has a public library and a historical museum. Thornton Academy (coeducational) was founded in 1811. Saco and Biddeford were both founded in 1630 and were called Saco until 1718 and Biddeford until 1762. Saco then renamed Pepperellboro, resumed its original name in 1805. It was chartered in 1867 and has a mayor and board of aldermen. Pop. (1940) 8,631; (1950) 10,324.

SACO, a river which rises in New Hampshire in the White Mountains, and flows southeast through Maine into the Atlantic Ocean. It is about 105 miles long and drains an area of 1,750 square miles. A number of rapids and falls in it furnish power for manufacturing.

SACRAMENTALS, certain objects, actions, or emblems, instituted or consecrated by the Roman Catholic Church, for the production of spiritual effects. Of such are the sacramental wine, bread or wafer; the rites of dedication, consecration, benediction; the emblem of the Agnus Dei or sacrificial lamb of God, in the celebration of the Mass or the Holy Eucharist. (See Sacraments.)

SACRAMENTARIANS, a religious term which at present is applied almost solely to members of the Christian church who sustain a "high" view of the efficacy of the sacraments. In past ecclesiastical history it had a wholly different meaning and was applied to those Reformers who refused to agree to Luther's doctrine of the real presence of the body and blood of Christ in the bread and wine. The Sacramentarian party were the authors of the Tetrapolitan Confession, so called from the four cities of Strasbourg, Constance, Lindau and Memmingen, which supported the Sacramentarian doctrines. This confession excluded all idea of a physical presence of Christ's body. The Swiss reformer Zwingli took a similar position on the question of Christ's presence in the Eucharist, and an article prepared by him declaring against the real presence was embodied in the confession of the Helvetic Church. The German Sacramentarians joined the general body of Protestants in resisting Charles V, and became merged with the Lutherans.

SACRAMENTO, city, California, is the capital of the state and the seat of Sacramento County. It is an inland port located in northern California at the confluence of the Sacramento and American rivers, 72 miles by air from San Francisco. The city, whose incorporated area is 16.88 square miles, lies at an altitude of 30 feet. It has a picturesque setting almost in the exact geographic center of Central Valley, with the Coast Range on the west and the snow-capped Sierra Nevadas on the east. The climate of the region permits the production of crops throughout the year in the rich, irrigated soil. The area is rich in certain other natural resources, such as timber, lead, pottery clay, oil, and natural gas. The natural gas fields and the water from the Sacramento River and its tributaries, harnessed to generate electricity, insure a plentiful supply of power.

Sacramento is an industrial, commercial, and cultural center, as well as the focus of state government activities. Most of the city's streets are broad and straight, and are tree-bordered in the residential areas and even along some of the commercial thoroughfares. There is little evidence of the extremes of poverty and wealth found in many cities; but in 1951 plans had been drawn up by the Citizens Redevelopment Advisory Committee for a 10-year building program to replace run-down areas with low-income housing projects, parks, and boulevards.

Transportation.—Sacramento is on the main lines of the Southern Pacific and the Western Pacific railroads; and the Atchison, Topeka and Santa Fe Railway has access to it over the rails of the Central California Traction Company, a freight road. The city is also on the Sacramento Northern Railroad, an intrastate freight carrier. From the city, all sections of Central Valley can be reached by highway, and federal highways connect it with other parts of the United States and with Canada and Mexico. There is a municipal airport with scheduled transcontinental and north-south commercial passenger service, connecting passenger schedules with trans-Pacific flights, and transcontinental air freight service. In the 1940's the annual tonnage carried by river craft in and out of the port ranged from about 800,000 to 1,400,000 tons. In the early 1950's another spoke was being added to this hub of transportation with the construction of a deep-water channel for ocean-going vessels, facilities for berthing these ships, and improved handling, transshipping, and storage facilities.

Business and Industry.—Sacramento has an extensive wholesale and retail trade. Among its industrial establishments are railroad shops, brick and clay yards, and factories where wooden boxes are made. As of 1951, however, its chief business was food shipping; and its chief industry, food processing. As a shipping point for fresh vegetables and fruits it ranked high in the United States. It had sugar beet refineries, flour mills, factories in which dairy products were made, and plants for canning and freezing fruits and vegetables, for shelling nuts, pickling olives, cleaning and polishing rice and beans, and preparing stock feeds. Although the city weathered the depression years of the 1930's exceptionally well, in the years following World War II the city's businessmen were working to attract new and more diversified industries. The 1950's may therefore see change in the economic pattern of Sacramento, with industry taking a more important place and a new emphasis upon the industrial byproducts of agriculture.

Educational, Cultural, and Recreational Facilities.—In addition to public elementary and high schools, the city maintains a junior college, and the Sacramento State College is located there. Sacramento also has Catholic parochial schools and private boarding and day schools. Both the Sacramento City Library and the California State Library are about a century old. The city's library contains a collection of approximately 323,000 volumes. The state's library collection totals about 500,000 volumes, including collections on law, Californiana, and publications in Braille. The Crocker Art Gallery contains a fine collection of drawings and paintings by such famed masters as Leonardo da Vinci, Michelangelo, Rembrandt, Albrecht Dürer, and Guido Reni. In the capitol and other state buildings are works of art, including modern murals depicting scenes from California history. The State Indian Museum contains exhibits illustrating the artifacts and ways of living of the California Indians. State-owned Sutter's Fort, a restoration of the fortified trading post with the ranch house, home, and workshop of the German-born settler with whose name California's gold rush is so closely associated, contains relics of those days. The Pony Express Museum, a city institution, contains relics of the city's early history. The building was once the office and relay station of the Pony Express.

In the city's places of worship all religions common to the United States are represented, and in it is one of the few Moslem mosques in the country. Sacramento has been the seat of a Catholic diocese since the 1880's.

Art, music, and other organizations, such as the Sacramento Civic Repertory Theater, also contribute to the cultural life of the city. The city owns and maintains Memorial Auditorium, with a hall seating 3,200 and an outdoor theater. For outdoor recreation, the city has a camp about 90 miles northeast in the mountainous region at which residents may live at cost for a two-week period during the year. Within the city limits are 32 well-distributed public parks and playgrounds covering 1,337 acres. In Capitol Park there are about 600 varieties of trees. Many of its 40,000 trees, bushes, and plants date from the time the capital was new and have come from all parts of the world. Because of the profusion of camellias in public and private grounds, California's capital is sometimes referred to as the City of Camellias. In the William Land Park are additional attractions—a zoo, an orchestral shell, and a golf course. The State Fair Grounds also offer a public place for picnicking and, besides the annual state fair, rodeos are held there. For organized sports there is the Sacramento Stadium with a seating capacity of 23,000, and Edmonds Field for professional baseball.

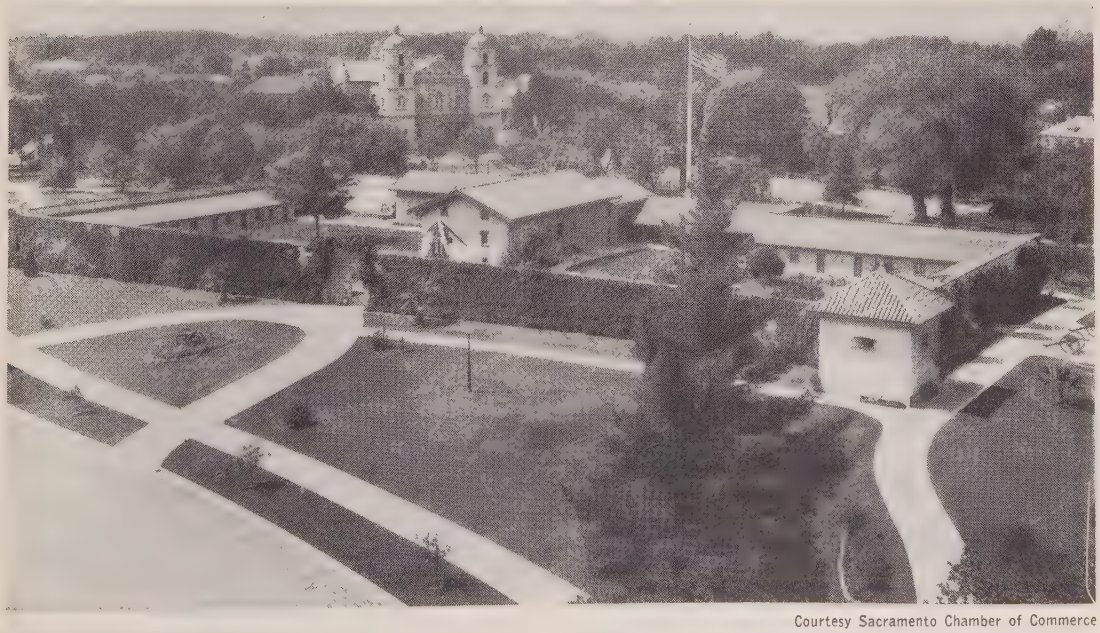
Other Points of Interest.—The building of the state capitol, on its sloping terrace in Capitol Park, was begun in 1860, and considered finished in 1874. It was constructed of California granite and white-painted brick, and its architecture closely resembled that of the national capitol. Extensive additions have since had to be made, and the cost up to 1952 totaled more than $10,000,000. The Memorial Auditorium, Italian Romanesque in design, is equipped with a fine organ and with chimes that ring out the national anthem once each day. The Tremont Hotel, built in the 1850's when Sacramento was a roaring frontier town and then considered one of its finest hostelries, still stands in the modern city. A brewery of the same period may also be seen near William Land Park.

Government.—Sacramento has a council-manager form of government with a mayor selected from among the members of the council, all of whom are elected at large on a nonpartisan ticket. The facilities owned and operated by the city include those of the port and the waterworks. The majority of the functions of state government are centered in the capital, and numerous branches of the federal government are represented there. At McClellan Field, adjacent to the city, the U.S. Department of Defense maintains an air depot as a repair and supply base for the Army Air Force. Mather Air Force Base, also near it, is a major training

center, and the U.S. Army Signal Corps also has a military installation nearby.

History.—In 1839, John Augustus Sutter, a German-born Swiss citizen, received permission from the Mexican governor to establish a colony in the interior of northern California. He and his party found a suitable place the same year on the south bank of the American River near its confluence with the Sacramento. There, with Indian, Mexican, and other help, he began clearing land, digging irrigation ditches, raising crops and livestock, and building his fort. The Mexican government granted him a total of 33 square leagues of land (nearly 87 square miles), including the present site of Sacramento. On this domain Sutter lived for a few years practically as an independent ruler. Soon after the occupation of California by American forces in 1846, he found so good a market for his produce along the northern California coast that he had several hundred men working for him. Great wealth seemed within his grasp. In January 1848, his chief carpenter, James W. Marshall, discovered gold in the tailrace of Sutter's mill on the south fork of the American River. That spelled the ruin of Sutter, for within a few months thousands of gold seekers were on the move by land and sea to California. The prices of farm products soared. Near Sacramento, 16 acres planted to potatoes brought $40,000. But Sutter did not profit. His farm hands left and joined the gold seekers, his stock was stolen, and squatters put up their tents and settled on his land. To save some part of his holdings, Sutter deeded a parcel of it along the Sacramento River to his son who quickly had a townsite plotted. The first lots were sold in January 1849 and, by August, river steamers from San Francisco were unloading passengers there. The town that sprang up was called Sacramento after the river which ran beside it, and it quickly became a supply and recreational center for miners. Before 1851, three newspapers were being published there. The town was ravaged by flood in 1849, but the following year it had a population of 6,820 and was incorporated. In the next few years, fire, flood, and a plague of cholera wrought their havoc. Nevertheless, this lusty town aspired to the honor of being the state capital, and in 1854 it was so designated. In 1856, the first railroad in the state connected the capital with mining towns along its 22-mile route to the northeast. In 1857, the Sacramento Library Association (from which the public library evolved) was founded, and among its founders were four young men from the East who were to make railroad history in a few years—Collis P. Huntington, Leland Stanford, Charles Crocker, and Mark Hopkins. In 1860, when the Pony Express was inaugurated, Sacramento became its western terminus. The population then numbered 13,785, and three years later it was incorporated as a city. In 1863, the Central Pacific Railroad began laying tracks east from Sacramento to meet the Union Pacific, thus giving the nation its first transcontinental rail route in 1869. It was the four men who had helped found the library association who were chiefly responsible for the building of the Central Pacific, and it was they who conceived the idea of joining it with other railroads, an idea which eventuated in the creation of the Southern Pacific in 1884. By then, the great gold rush days had long since passed; but the main supports of the city's present-day economy had been laid, and the feverish search for quick riches had given place to the development of agriculture in the area. Steadily, though unspectacularly, the modern city took shape. Levees and high street curbs were built in the early years to protect the city against floods; but, later, dams began to be constructed on the American and Sacramento rivers to provide a more even flow for the generation of electric power. These dams helped to control floods; but in the 1940's the building of multipurpose dams specifically included flood control among their objectives.

Population.—The foreign-born in Sacramento's early population were mostly Swiss, Ger-



Courtesy Sacramento Chamber of Commerce

Sutter's Fort.

man, and Irish. Mexicans, Italians, Greeks, Chinese, Filipinos, and Japanese largely made up the foreign-born population by 1940. Other changes came in the following decade. By 1950 the Japanese population was smaller than it had been before World War II brought about by the temporary removal of Japanese from West Coast areas; and the Negro population had increased. The following figures give the total population growth in the current century: (1900) 29,282; (1910) 44,696; (1920) 65,908; (1930) 93,750; (1940) 105,958; (1950) 137,572.

SACRAMENTO, a river in California which rises in the northern part of the state, flows south in the valley between the Sierra Nevada and the Coast Range and, uniting with the San Joaquin River (q.v.), both break through the Coast Range, and enter the Suisun Bay, from which the waters pass through a strait into the Bay of San Pablo, and to the Pacific through San Francisco Bay. The chief tributaries are the Pit and Feather rivers. The Sacramento is about 400 miles long; from the source of the Pit to the mouth of the Sacramento is about 600 miles. The river is navigable for about 270 miles from its mouth, and the Feather River for about 30 miles from the Sacramento. The débris from placer mining has been a hindrance to navigation.

Gabriel Moraga in 1808 gave the name Sacramento to its tributary the Feather, while the lower Sacramento was still called the Rio de San Francisco. However, Moraga's name was soon applied also to the lower Sacramento, as appears in a map of about 1824. Wilkes' map of 1841 finally established the river's name and course.

SACRAMENTS.—The word *sacrament* is derived from the Latin word *sacramentum,* which in its original use was employed for the oath taken following enrollment in the Roman armies; a legal use of the same word referred to a deposit made by those engaged in court-action, with the understanding that the loser forfeited his *sacramentum* to the state treasury, which, as some suppose, employed the money for sacred purposes. The fact that the word, in its root and significance, suggests something set apart as holy, indicates that both the military and the legal *sacramentum* were regarded as having some religious character.

Ecclesiastical Usage.—The term is more generally employed in contemporary usage to describe a sacred religious practice, although it can also have the connotation of a holy mystery; hence, it is related to *mysterion,* the Greek term employed to describe some hidden truth or reality which is made known to men through the revelation of God. It is with its ecclesiastical usage, however, that this article is concerned, since that is the prevalent sense of the word in ordinary speech.

Ecclesiastical Definition.—In this connection the term *sacrament* can be used in a general or in a narrower meaning. In the former, it is defined by St. Augustine as *signum sacrum* or *signum rei sacrae* (sacred sign or sign of a sacred reality), a definition which has been generally accepted by Christian theologians. The Anglican Book of Common Prayer gives a fuller statement, "an outward and visible sign of an inward and spiritual grace." The sacramental idea suggests that there is a general principle running through the created world, in which corporeal or material things are the expressive media for unseen, but genuine, realities of a spiritual kind. Values, ideals, and purposes are operative in, and their reality is expressed through, such material and corporeal realities: goodness is known and seen through good acts; beauty, through beautiful objects; love, through loving persons. More significantly, it is said that God is known in this fashion. St. Thomas Aquinas wrote: "Through signs that can be perceived by the senses, the mind is stimulated in its aim towards God"; and Catholic Christianity has maintained that the normal means for reaching the divine Reality is through such sacramental impressions of God.

Physical contacts, material realities, things done in the realm of the visible, tangible, corporeal, or sensible, are for Catholic Christianity the most effective way in which states of mind, attitudes, beliefs, and certainties of many sorts may be stimulated and even inaugurated, as well as deepened and enriched. Central in this pattern of material expression of spiritual reality is the Incarnation of God in Christ, in which it is believed that God employed, sacramentally, a human life as his means of self-expression in the created order.

Definition According to Rite.—When this general sense of the word *sacrament* is restricted to the ecclesiastical rites of worship, the definition of Hugh of St. Victor is adequate: "a corporeal or material element offered to the senses, which from likeness represents, from institution signifies, and from consecration contains, some invisible and spiritual grace." This definition includes four points which have generally been maintained as essential to a sacrament:

(1) The sacrament must have a sign which is a visible reality. This may be the pouring of water, as in baptism; the bread and wine of the Lord's Supper, Holy Communion, or Mass; the laying-on of hands, as in ordination and confirmation.

(2) Further, the sacrament must have some spiritual grace or gift, which is conveyed to the faithful recipient. In baptism this is forgiveness of sin and incorporation into the Church of Christ; in the Lord's Supper, the body and blood of Christ; in ordination, the grace of ministry; in confirmation, the strengthening for responsible Christian life.

(3) The sacrament must in some sense have been divinely instituted; it cannot be a mere human invention, but in one way or another must have attached to it the promise of the divine purpose, whether by explicit institution, as in the Last Supper of Jesus with his disciples, for the Holy Communion, or by some more general direction which has led to such a rite, as in the unction of the sick.

(4) Finally the sacrament must be efficacious in that it conveys or contains that which it professes to do; the view is held in Catholic Christianity that sacramental rites are not merely edificatory or teaching signs, but actually effect some result through their performance.

This definition has been further refined by theologians, such as Aquinas, in order to include the following ideas: *matter* of the sacrament, or some external and visible thing such as the eucharistic elements of bread and wine; *form* of the sacrament, or words which explicitly state the intention for which the rite is being performed; *minister* of the sacrament, or a person properly authorized to conduct the rite; *benefit,* or the good result which follows. A *valid* sacrament is one in which all these conditions are met.

In the Eucharist or Holy Communion, another term is introduced, the *res* of the sacrament, the underlying reality which it contains and conveys; in the Eucharist this is the body and blood of Christ.

Sacraments as Symbol and Instrument.—From the definition quoted above from Hugh of St. Victor, the phrases "from likeness represents and from institution signifies" introduce another set of ideas that have, especially in recent years, been much emphasized by theologians, especially Anglicans, such as Oliver Chase Quick: a sacrament is both a *symbol* and an *instrument.* By symbol is meant that there is in a sacramental rite some likeness which, in Hugh's phrase, "represents" that which is being commemorated or conveyed. Hence bread and wine in the Eucharist from likeness represent the body and blood of Christ, in this instance by divine institution; or in baptism, the pouring of water represents, from likeness, the washing away of sin (dirt) which soils the personality of the recipient. On the other hand, the sacrament is not merely symbolic, since it is a sign which effects what it symbolizes; it is thus instrumental. To some degree this notion rests back upon the Aristotelian conception of "efficient cause," and is suggested by St. Thomas Aquinas in his general discussion of the subject in the *Summa Theologica* where he uses the illustration of a woodman's ax effectual in felling a tree. The Reformed theologians of the 15th century were divided on this matter, some resting content with a merely significatory understanding of the sacrament, others, as in England, insisting that a sacrament is an "effectual sign"; compare the Anglican Articles of Religion, in the Book of Common Prayer.

Number of Sacraments.—Throughout Christian history the problem of the number of ecclesiastical sacraments has been a matter of theological discussion. All Christians, except the Society of Friends, have accepted baptism and the Eucharist as sacraments "generally necessary to salvation," in the sense that their use is the normal way of admission to, and participation in, the benefits of Christ; although there have been widely differing interpretations of the sense in which this is true. On the other hand, Catholic Christianity, in both eastern and western forms, has said that there are five other rites, of a sacramental nature, which may properly be called sacraments. These are: confirmation, marriage, absolution or penance, holy orders or the rite of setting-apart for the ministry, and unction or the anointing of the sick or dying. It was not until the Middle Ages that the number was set at seven, and even this does not provide for the variety of less formal rites and actions or objects which in Western Catholicism are called sacramentals.

Meaning of the Sacraments.—In the full scheme of seven sacraments, certain of the group are believed to be effective in conveying character or status in the relation of the recipient to God and Christ. In baptism, the person receiving the sacrament is made a member of the Body of Christ, the Church; in confirmation, he is given the special status of a communicant; and in ordination, he receives the position of an ordained person with particular rights which attach to this office. In this meaning of character the three sacraments are said to be "indelible"; that is, they can never be repeated because the status which has been granted is a permanent status. Protestant theologians have tended to deny this view, especially as regards ordination; but in the Anglican Church it has usually been held, as well as in the Roman Catholic and Eastern Orthodox churches.

Finally, the more traditional Christian view is that the sacraments are effectual apart from the moral character of the minister; this is the basic meaning of the concept of their operation *ex opere operato.* The Anglican Articles of Religion state this in the phrase: "That the unworthiness of the minister hindereth not the sacraments." In this way, it is said, the recipient is not dependent upon the intangible factor of ministerial holiness or intention. However, it is always considered necessary that a minister shall have at least this much by way of "intention": he shall purpose to do that which the church itself intends, even if his understanding of this is not complete. The sufficient guarantee that he so intends is his use of the normal matter and form which the church has prescribed and the fact that he is himself a properly authorized person to perform the rite.

Various Interpretations.—The interpretation of sacraments differs in the various Christian denominations and churches. The outline already given is in general that of Catholic Christianity, including the Anglican Communion. The Reformed churches of the continent of Europe, with their offspring in other parts of the world, have variations on this view. Calvinism and Lutheranism, as well as the followers of Zwingli (the Reformed Church, properly speaking), have tended to take a less systematic view, holding that the efficacy of the sacraments is due to the blessing of Christ, and that the formalized scheme is not necessary for an understanding of their operation. In some of these groups, great emphasis is placed on the faith of the recipient; although all Christians have maintained that, in one way or another, "faith is the means whereby we receive the sacrament."

More detailed discussion of the particular views of the several Christian groups may be found in the bibliographical notes. It is important to observe, however, that in recent years there has been a much stronger emphasis, throughout Christianity, on the importance of the sacramental idea in general and the significance of sacramental rites within the Christian Church. This has been associated with the liturgical movement of the Roman Catholic Church and with similar movements found in other denominations.

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SACRE-COEUR, sȧ'krā-kûr, **Basilica of the,** Paris, France, church dedicated to the Sacred Heart of Jesus, located at the summit of the Butte Montmartre. Decreed by a law of 1873 as a national votive offering after the Franco-Prussian War, the enormous cost of the basilica was met entirely by subscriptions and voluntary donations. It was begun in 1875, completed in 1914, and dedicated in 1919. The design from the plan by Paul Abadie (d. 1884), is 12th century Byzantine-Romanesque. With its numerous cupolas and

domes the Sacré-Coeur is the most unusual church in the city. Subsequent architects continued Abadie's general plan; the campanile, however, was raised according to the design of Lucien Magne, who completed construction. The church is built of white stone and concrete, and from its commanding position, is visible from almost every part of Paris. The main dome stands about 296 feet above the crypt. Around it is a gallery from which there is a view extending 35 miles on a clear day. The campanile, which rises 267 feet from the ground, contains la Savoyarde, one of the largest bells in the world. See also PARIS—*Points of Interest* (Religious Buildings).

Consult Laligant, P., *Montmartre, la basilique du voeu nationale au Sacré Coeur* (Grenoble 1933).

SACRED HEART OF JESUS, in recent centuries, one of the most widespread and cherished practices in the Roman Catholic Church. It is based on the church's teaching with regard to its founder, Jesus Christ, who is both God and man, that is, He is but one single person having both the nature of God and the nature of man. Since Jesus Christ is a divine person, the second person of the Blessed Trinity who has become man, His Heart is truly "the divine Heart which wrought our salvation," to which is owed "honor and glory forever." Hence devotion is directed to the person of Jesus Christ, to His living, sentient Heart, and to that Heart as a symbol of the love that He has for His heavenly Father and for men. This devotion has a manifold purpose: to honor Christ, the Saviour of mankind; to seek that men's hearts be inflamed with love for Him whose love for them is recalled by thought of His Sacred Heart; and to make reparation for injuries committed against Him. Scriptural foundation for the devotion is found in the many references to the heart as the seat of thought, will, and affection, to Christ's own words, "Learn of me, because I am meek, and humble of heart" (Matthew 11:29), and other texts. Although there are patristic and medieval references to the Heart of Christ, as in the writings of such saints as Cyril, Cyprian, Basil, Ambrose, Francis of Assisi, Bonaventura, Bernard of Clairvaux, Gertrude, and Mechtilde, it was in the 17th century, partly in reaction against Jansenism, that the devotion began to spread most rapidly and widely among Roman Catholics. Chief among those who promoted it were St. Jean Eudes (1601–1680), Blessed Claude de la Colombière (1641–1682), and especially St. Marguerite Marie Alacoque (1647–1690), a Visitandine nun of Paray-le-Monial, France, whose letters contain records of private revelations that have become known as "the promises of the Sacred Heart." The 12th of these, "the great promise," reads: "The all-powerful love of My Heart will grant to those who shall communicate on the first Friday of nine consecutive months the grace of final perseverance." Closely connected with this devotion is that to Jesus Christ in the Holy Eucharist, with the attendant practice of frequent reception of Holy Communion. The devotion has inspired many beautiful prayers, notably the *Litany of the Sacred Heart,* the *Morning Offering,* and acts of consecration to the Sacred Heart. The Society of Jesus has long taken a leading part in promoting the devotion. The League of the Sacred Heart, commonly known as the Apostleship of Prayer, founded in France in 1844 by Father Francis X. Gautrelet, has a membership of over 30 million, and publishes its organ, *The Messenger of the Sacred Heart,* in many languages. Various religious communities, both of men and of women, have been dedicated to the Sacred Heart. Celebrated on the Friday after the octave of Corpus Christi, and usually falling in June, the month dedicated to the devotion, the feast of the Sacred Heart was established in 1765 by Pope Clement XIII and extended to the universal church by Pope Pius IX. Pope Leo XIII consecrated the human race to the Sacred Heart, and Pope Pius XI decreed that this consecration be renewed each year on the feast of Christ the King.

Consult Galliffet, Joseph de, *The Adorable Heart of Jesus* (Rome 1726; Eng. tr. London 1887); Dalgairns, John B., *The Devotion to the Sacred Heart of Jesus,* 3d ed. (London 1910); Wynne, *The Great Encyclical Letters of Pope Leo XIII* (New York 1903); Pope Pius XI, *Encyclical Letters,* "Quas Primas," "Miserentissimus Redemptor," and "Caritate Christi compulsi."

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SACRIFICE.—The word *sacrifice* has two radically different connotations, and failure to recognize this opposition has often caused confusion in theological thinking.

Secular Definition.—The modern secular use of the word describes voluntary deprivation; its definition may be epitomized in "giving up." That which is given up—possessions, happiness, reputation—is always of some value to the sacrificer. It is frequently destroyed, or may pass into the possession of someone else, who is not, however, regarded as the recipient of a sacrifice. The deprivation is always effected so that the sacrificer may achieve a purpose which, to him or to some other person or cause, is of greater value than that of the object sacrificed. Illustrations of this are seen in the expressions, "He sacrificed his position for his principles," and "The soldier made the supreme sacrifice." The Oxford Dictionary gives the date 1706 when *sacrifice* was first used as a verb in this sense; as a noun it had been so used much earlier.

The word came into use by medium of the Christian Church, which had taken it from the religions which formed the milieu of its early life, the Greek, Jewish, and Roman, in which it was invariably used with reference to cult, having no secular significance whatever. To understand the meaning of the word we must turn to these three religions.

RELIGIOUS BACKGROUND

Sacrifice comes from the Latin noun *sacrificium,* and the verb *sacrificare,* which are blanket terms for any religious act in which a thing is made sacred, that is, given to a deity and made his property. If that which was made sacred was an animal or a cereal for the purpose of preservation of the life power of the deity and thus keeping him favorable, it was burned in order that the food, sublimated into smoke, might rise to the upper air where the deities lived. A handful of food thrown into the hearth fire by the father of the family at a meal was a *sacrificium.* Instruments used in the process of public sacrifices, temples where the process was carried on, and articles of adornment of the temples were likewise made sacred. Rites of lustration or purification with the purpose of warding off demons and evil influences were also called sacrifices.

The rules and ceremonies for these rites were meticulously preserved from early days in the *jus divinum,* which was the body of regulations for

keeping people in the good graces of the gods, as the *jus civile* prescribed the regulations for keeping them in the good graces of the city or state.

Greek Rites.—The Greek language had no such blanket term to describe religious rites. Rites in honor of the deities of the upper air (Olympus) were called *thusiai;* those offered to chthonic powers were called *sphagia.*

Thusiai.—Thusiai were always offered by daylight, preferably in the morning. Certain parts of the victims, the steaks, were burned on a *bomos,* a large stone or a pile of stones raised higher than the worshipers; the remainder was eaten by the worshipers as part of the rite. The act of burning the flesh for the deities was *thuein* or *hiereuein.* The rites were concluded by music and dancing. Their purpose was to honor the friendly deities.

Sphagia.—Sphagia were offered by night. The rite was described by the verbs *sphagiazein* (to slaughter), *enagizein* (to make taboo), and *holokautein* (to burn wholly). The victims were burned on an *eschara,* a rude stone laid as close as possible to the ground or in a trench dug for the purpose. None of the animal was eaten, and the whole eerie rite was performed in silence. The purpose was placation or aversion of unloved powers.

Our translations of all these Greek words have come through the Latin and have lost the sharp distinction between the rites. *Thusiai* and *sphagia* have both become *sacrifices;* all the words describing the rite have become *to sacrifice; bomos* and *eschara* have both become *altars.* The result is that we hear of two kinds of Greek sacrifice, thus confusing rites which should be sharply distinguished.

Jewish Rites.—Jewish rites were likewise described by different vocabularies, with no blanket term to group them together.

Zevach and 'Olah.—The best known was the *zevach,* which was, in most ways, a counterpart of the Greek *thusia,* by which it is translated in the Septuagint. In Judaism, after the return from the captivity, the *'olah* gained increasing significance. In this rite an animal was wholly burned on an altar, and none of it was eaten by priest or people. This was not a rite of aversion or placation. As the smoke of the *zevach* carried the choice parts of the victim to the sky, where Yahweh lived, and was thus an offering of the best part of the food to the deity, the *'olah* was considered as offering the whole animal to the deity, thus becoming the greatest possible gift which could be offered. Long after Yahweh was considered to have no physical form, both these rites were continued with increasingly analogical interpretation.

When the Hebrew Bible was translated into Greek, *zevach* was easily rendered by *thusia.* Translation of *'olah* gave difficulty. All Greek rites in which an animal was wholly burned were rites of placation and aversion but *'olah* was honorific, and could not be rendered by *holocauton.* The translators ingeniously coined other words from the same Greek roots, but differently spelled and with slightly different endings. When the Greek Bible passed into Latin the distinction was lost. Latin had no rites equivalent to Greek *holocauton,* and the Greek was latinized into *holocauston* (wholly burned). This came into the Douay version as "holocaust." The King James version tried to remedy this by coining the compound word "whole-burnt offering."

Pesach.—The oldest sacrificial rite continuing to the present day is the Jewish annual Pesach (translated "phase" and "pasch" in the Douay version and as "passover" in the King James version). It preserves the primitive communal meal, with no burning of any part on an altar by priests. The blood of the animal was smeared upon the door posts of the house where the rite was performed, as a prophylactic against dangerous misfortune.

Purification Rites.—In addition to these sacrifices, Judaism had many rites of purification, which probably arose from taboo rites; one could not worship if he were taboo, and the taboo had to be solemnly removed before one could participate in worship. Judaism early extended its taboos to include moral disqualifications. Underlying all those rites was the fundamental principle that sacrificial worship was an act of the group and not of an individual *per se.* Therefore every individual in the group, as well as the group as a whole, must be free from physical and moral taboo, whether conscious of it or not. The place of worship, the altar, must likewise be certainly free from deliberate or accidental contact which it might have had with a taboo person.

The common method of purification was smearing or sprinkling with blood, the principle of life. This might be performed as a special act, but it was always a necessary preparation for offering a sacrifice. The natural source of the blood was the animal to be sacrificed.

Sacrifice as Worship.—These rites would be better understood if the word *sacrifice* were confined to the rites of worship as the solemn acts for which purification was a necessary preparation, and in which some solemn act was performed with an animal which had been killed for the purpose.

Animal Sacrifices.—The death of the animal was an incidental, necessary fact in order that the sacrifice might be performed; it was not a factor of the sacrifice. The death of all individual animals or cereals which we eat is still a necessary fact or event occurring either before or during the process of eating the food; it cannot be regarded as a factor of the meal. Thus the death of the animal was never on the altar. For obvious physical reasons the beast was slain as near the altar as was in keeping with whatever reverence accompanied the sacrifice. After the victim was killed there were three possibilities for disposal of the carcase. (1) The worshipers might eat all of it. (2) They might eat part and sublimate part into smoke for the gods. (3) They might burn all of it.

The Offering Devoured.—The first method was that of the Jewish Pesach, the Greek *bouphonia,* the strange rite of the 'Aisāwa, a Moslem fraternity in Algeria [described by Theodor Nöldeke, in "Arabs (ancient)," *Encyclopaedia of Religion and Ethics,* vol. 1, p. 665b], and in many other primitive rites, all of which had their origin in days before men had any concept of deities. The common meal of the early family or clan or tribe was the method by which the life power and the qualities of the animal were appropriated by those who participated in the feast. Totemistic concepts of "eating the god" may well have contributed to the development of the rite.

Partial Sublimation.—With the growing conviction that the mysterious life powers, which men wanted to appropriate, were sentient beings, it was simple to picture the smoke of their roasts ascend-

ing to those beings. It was but a step to the conviction that a portion of the meat should be sent up to the gods. Thus may well have arisen the regular, official sacrifices which we see most highly developed among the Greeks and Hebrews, the *thusia* and the *zevach.* In both these sacrifices the idea of thanksgiving was highly developed, expressed in Greek by the word *eucharistia,* which passed into Christianity.

We are able to reconstruct the ritual acts of both Greek and Hebrew sacrifices which were remarkably similar. In both were three distinct parts, the preparation, the sacrifice proper, and except in the *'olah,* the meal, accompanied and followed by music.

In both religions the preparation consisted of purification from normal and accidental uncleanness from daily living and from acts and crimes which constituted barriers to worship. In Greek rites this was accomplished by lustration. In Jewish rites it was accomplished by manipulation of the blood of the victim, and included the altar as well as the worshipers. At the end of these rites the animal was killed and dissected. In Jewish rites this killing was prescribed to be done by the worshiper.

The priests then performed the sacrifice itself by burning on the altar the choice parts of the flesh of the victim. Homer gives elaborate descriptions of this in two places in the *Iliad,* and two in the *Odyssey,* with almost identical words in all four. The sacrifice (except, of course, the *'olah*) was followed by the meal for which meticulous rules are prescribed in Greek inscriptions. For large, official sacrifices the music was as elaborate as possible. The aim was always to make the sacrifice as large as possible, with as many victims as could be provided.

Total Sublimation.—From biblical Judaism comes the sacrifice in which none of the victim was eaten. The animal was flayed because his hide was the perquisite of the priests in both Greek and Jewish sacrifices. The burning of all the remainder upon the altar lent itself easily to lofty spiritual interpretation.

Decline of Sacrifices.—There was no possible connection between this whole-burnt offering and the Greek aversion and placation rites to which reference has been made. With the destruction of the Temple in 586 B.C. Hebrew sacrifices came to an abrupt conclusion. The priests and the better part of the people were banished to Babylonia. They were convinced that no Jewish sacrifices could be offered outside the Temple in Jerušalem. Judaism became a sacrificeless religion until the return from the captivity and the building of a second Temple more than a century later. During this time the tradition of the sacrifices and their ritual were reduced to writing in the Pentateuch (Torah) which forms the sole early source for study. No one knew when sacrifices had been introduced. Many of them probably came from the Phoenicians who built the Temple for Solomon.

All Jewish sacrifices must be accompanied by an offering of cakes of fine flour called the *minchah,* translated in the Douay version as "oblation of sacrifice," in the King James version as "meat offering," and in the Jewish version as "meal offering." In certain instances this could even be substituted for an animal sacrifice.

With the establishment of synagogues in Palestine after the return from the captivity and the dispersion of the people into distant lands, it became increasingly difficult for a Jew to go to Jerusalem where alone sacrifices could be offered. Pious folk who could afford them might make occasional pilgrimages, but, for the greater part of Judaism, sacrifices were impossible. They learned to content themselves with prayer, fasting, almsgiving, and reading of the Torah as adequate surrogates for sacrifice. Thus, by the time of Jesus, Judaism had been largely weaned from this worship. With the destruction of the Temple in 70 A.D., Jewish sacrifices were brought to an end. Greek sacrifices took another two centuries to peter out.

Latin Sacrifices.—Latin sacrifices were of an entirely different kind. Latin deities were not so clearly developed personalities as Greek gods and the Hebrew Yahweh. Native Latin rites were strongly influenced by the Etruscans who may originally have come from Babylonia. One can find in Latin sacrifices a strong resemblance to those of Babylonia in the importance placed upon study of omens.

The Study of Omens.—Babylonia: In Babylonia the study of the configurations of the liver seems to have been the principal reason for religious slaughtering of animals. The will of the gods could be ascertained by careful study of the contour and markings of a sheep's liver. Babylonian tablets abound in meticulous directions for this study. For removal of the liver the animal had to be killed. Once more the death of the victim was a fact but not a factor of the rite. After examination of the liver, some disposition of the carcase had to be made, and this disposition developed into elaborate rites. All of this is reflected in Latin rites.

Among the Greeks and the Jews: In Greek sacrifices the killing of the animal afforded a good opportunity to examine the organs for omens. This examination was usually an incidental accompaniment of the rite and not the primary purpose of it. The Jewish law positively forbade liver omens of any kind.

Rome: Among the Romans the primary purpose of the rite was for the study of omens shown by the *exta,* the name given to the organs below the diaphragm. The animal, adorned with fillets and ribbons to mark it as holy, was led to the altar, where it must go willingly; it was further sanctified by sprinkling pieces of cake and pouring wine upon it. After the animal was killed, the *exta* were dissected, carefully examined, cooked, and laid upon the altar fire with selected pieces of flesh. The remainder of the flesh lost its sanctity and became the property of the priests. The whole sacrifice was performed in silence, save for weirdly playing pipes to drown other noises.

The burning of the *exta* was a necessary sequel to the examination for omens. These organs had been used for a solemn purpose and could therefore be used for no other. With the rise of the concept of deities, the examination for omens could well be interpreted as learning the will of the god; the burning of the *exta* would be sending them up to the god. The addition of pieces of flesh marked a definite offering of some kind.

The normal Latin sacrifice had no common meal. A very few minor rites are found in which such a meal was eaten but these rites were not encouraged by the *jus divinum* and were in no way official. The gladness, joy, and thanksgiving which marked Greek and Hebrew sacrifices were no part of Latin rites. When Latin became the chief language of the Mediterranean world the

same *sacrificia* was employed to describe all other rites, even though they were totally different in purpose and technique.

ORIGIN AND DEVELOPMENT OF SACRIFICES

Much that has been said of the origin of sacrifice has been marked by the confusion of thinking which came from Latin use. It is impossible to group together honorific rites with glad thanksgiving, aversion rites with weirdness and horror, omen rites and purification rites, and try to find a single origin for the whole conglomeration.

Causations.—Fear of misfortune, taboo, and demons may well explain most of the aversion rites, and may have given rise to many of the purification rites, while omen rites, desire to learn the will of the gods, may have descended from methods of gratifying the natural desire to probe the future. Omens were derived from those phenomena unexplainable by known causes. The deities as the life powers were naturally regarded as the ultimate cause of these phenomena and might well reveal their plans by the markings of the liver which, as its name in English indicates, was supposed to be the seat of the life-soul because it is the bloodiest organ of the body. The "gift-theory," proposed by Edward B. Tylor in *Primitive Culture . . .* , 2 vols., 5th ed. (London 1929), may well explain the continuance of sacrifices and their development. It does not explain their origin which antedates any concept of deities. Men were led by worship to know their deities; they did not invent worship because they believed in deities.

Totemism.—Totemism, studied in detail by James George Frazer in *Totemism and Exogamy . . .* , 4 vols. (London 1910), and *The Golden Bough, a Study in Magic and Religion,* 12 vols., 3d ed. (London 1911–1926; reprint 1951), may well have marked the first clear step toward the idea of a worshiper's appropriating the power of the deity within himself, as seen in the rites in which the victim was wholly eaten. However, we have not solved the problem of how totemism arose. We realize also that totemism makes no contribution to the origin of the better known and more regularly observed sacrifices.

The only common origin of sacrifice, omen rites, and rites of purification and aversion, seems to have been primitive man's conviction that, in addition to the physical objects which formed his environment, there were invisible and unpredictable powers which made themselves known through those physical environments. Some of these seemed friendly and some inimical. One kind of rite tried to establish union with the former; a totally different kind tried to banish the latter.

Classification.—When W. Robertson Smith, in lectures on the *Religion of the Semites,* 3d ed., pp. 421 ff. (London 1927), classified sacrifices as (1) of tribute, (2) of communion, (3) piacular (expiatory), and (4) substitutionary, he was using sacrifice in the Latin sense, and continued the confusion by including in number (4) the rites of the Day of Purification which were held in the early part of the Jewish New Year by purification of priests and people of all unconscious sins of the year passed.

Day of Atonement.—The name, Day of Atonement, uses a 16th century word to translate Greek and Hebrew words which described purification, but had no suggestion of reconciliation. On that day alone the sins of priest and people were solemnly transferred to the scapegoat which was then not sacrificed, but driven "into the wilderness" by acolytes who had to be purified from their contact with the sin-laden beast.

Here was the only instance in which the "laying on of hands" was specifically interpreted. This was probably because the meaning was different from the customary use of the term. In every Jewish sacrifice the worshiper had first to lay his hand upon the beast before he killed it. This is never explained as transfer of sins; it was probably a means of some sort of identification of the worshiper with the victim, which was to be offered, at least in part, to Yahweh.

Christian Concepts of Sacrifice.—The Greek word *thusia* was used by early Christians to describe the work of Jesus, the ideal of Christian living, and the Eucharist, which was always the great act of worship of Christians until the 16th century and has continued so in the Roman, Orthodox, and Anglican communions. When this word was translated into Latin as *sacrificium,* the confusion of thinking commenced which has marked many Christian writers. The confusion was worse complicated by the assumption that the death of the victim was a factor, as well as a fact, in the sacrifice. This was climaxed by identifying the sacrifice solely with the death of Jesus. This was possibly the unlucky first step toward the modern concept of sacrifice as the very reverse of what it was in days when its significance was solely cultic.

Animal sacrifices were always, at best, bulky, clumsy, and dirty. It is small wonder that they passed out of existence. It is also small wonder that Christian ideals and worship were interpreted as the spiritual fulfillment of these rites, and that Judaism found in fasting, almsgiving, prayer, and reading of the Torah a similar fulfillment.

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SACRILEGE, săk'rĭ-lĕj, the profanation of a holy place or holy thing, and by extension of meaning, any act which blasphemously misuses or desecrates divine things, names, persons, or places. The origin of sacrilege as a quasi-legal term is in the Code of Justinian, which made robbery from churches a crime punishable by death. The concept, however, has earlier sources in regulations, such as those in the Greek temples and in the Temple in Jerusalem, where trespass on holy ground was sacrilegious and punishable in some instances by death. Only since the 19th century has the legal treatment of profanation of church buildings and associated crimes been similar to that of other more secular offenses.

Apart from the strictly technical sense of sacrilege as profanation, there is the extended meaning which is nearly synonymous with blasphemy. Here too there have been special legal enactments to punish misuse of the name of God or the Holy Communion, although in recent years there has been some relaxation in enforcement.

In Great Britain it is still a sacrilege to employ the name of God on the theatrical stage, while in the United States several famous cases in law have arisen from purported sacrilegious dramatic productions.

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SACRISTAN, săk'rĭs-tăn, an officer of the church, in charge of the sacristy and the sacred objects in it, particularly in Roman Catholic and Episcopal (Anglican) churches. The term derived from the medieval *custos ecclesiae,* whose office included guarding the sacristy and the sacred vessels and vestments used in divine service. It has fallen into desuetude in those Protestant churches where the service is simplified, often to the point of extinction, so that the duties of sacristan have largely disappeared. In these churches his place has been taken by the *sexton* (a corruption of *sacristan*), whose function corresponds more to that of general caretaker, while the duties of the modern sacristan remain similar to those of the medieval *custos.* In cathedrals and collegiate churches the sacristan is always in holy orders, but in smaller churches his place is usually filled by a layman. See also Sexton.

SACRISTY, săk'rĭs-tĭ, a room, in ecclesiastical architecture, in or attached to the church, where sacred vessels and utensils are kept, and where the clergy vest for divine service. The sacristy is now used primarily in Roman Catholic churches, and in those Protestant churches which conduct an elaborate ceremonial. Reformed churches, which maintain a simplified service and use few holy objects, have no sacristy, and its place is taken by the vestry.

SACROBOSCO, săk-rō-bŏs'kō, **Johannes de** (also John of Holywood, or of Halifax), English mathematician: b. probably Halifax, England, near the end of the 12th century; d. Paris, France, 1256. Sacrobosco is thought to have studied at Oxford University, going to Paris to teach about 1230. He was one of the first medieval scholars to make use of the mathematical writings of the Arabians. His fame rests principally on a small work, *Tractatus de sphaera mundi,* which paraphrases some of the more elementary ideas of Ptolemy, and of the Arabian astronomers al-Battani and al-Farghani. The *Sphaera mundi* had great popularity during the Middle Ages, although it was completely inoriginal, and as late as the 17th century it served as a basic text for teaching astronomy. It was the second astronomical work to be set in print (Ferrara 1472), and by 1669 had appeared in many subsequent editions, often with commentaries by the most distinguished scholars of the time. Sacrobosco was also the author of a work on arithmetic, *Algorismus.*

SACROILIAC, să-krō-ĭl'ĭ-ăk. Relating to the sacrum (q.v.) and ilium—the articulation between them and the associated ligaments. See also Pelvis.

SACRUM, să'krŭm (Lat. *os sacrum,* sacred bone), bone found in all vertebrates, at the lowest extremity of the spinal column. In man the sacrum lies between the last lumbar vertebra above, the coccyx below, and the coxae on either side, thus closing the posterior wall of the pelvic girdle. The point of junction between the sacrum and the coxae (ilia) is known as the sacroiliac joint. The largest bone of the spine, the sacrum is composed of the five (sometimes six) sacral vertebrae, which, in the adult, fuse into a single wedge-shaped bone, broad at the top (*base*), and tapering down to the narrow *apex.* The anterior surface, smooth and concave, is cut in the middle by transverse lines, where the vertebrae have welded. The posterior surface is rough and convex, ridged by five vertical projections. The center ridge, which is most protrusive, results from the fusion of the spinous processes of the sacral vertebrae forming the sacrum. The fifth vertebra, however, has no spine. The sacrum of the female is shorter, proportionately broader, and has a flatter curve than that of the male. The sacrum of human beings has greater relative breadth than that of lower vertebrates, in whom the number of sacral vertebrae varies from two to nine.

SACY, să-sē, Baron Antoine Isaac Silvestre de, French Orientalist: b. Paris, France, Sept. 21, 1758; d. there, Feb. 21, 1838. The son of a notary, de Sacy received a thorough education in Greek, Latin, Hebrew, and the modern Oriental languages; but from 1781 to 1792 he was professionally connected with the Cour des Monnaies, pursuing his scholarly interests privately. Despite his outspoken Monarchism, he was appointed professor of Arabic at the Ecole des Langues Orientales Vivantes in 1796, and in 1806 became professor of Persian at the Collège de France. De Sacy held numerous positions; among these were translator for the government, member of the legislature from 1808, royal censor under Louis XVIII, rector of the University of Paris, administrator of the Collège de France, director of the Ecole des Langues Orientales, curator of Oriental manuscripts in the Bibliothèque Royale (now Bibliothèque Nationale), and member of the commission for public education. In 1833 he became perpetual secretary of the Académie des Inscriptions et Belles-Lettres. Napoleon I created him a baron, and Louis Philippe made him peer of France. Indefatigable in editing and translating Arabic and Persian manuscripts, de Sacy was particularly successful in the field of Arabic literature, in which he translated works of prose, poetry, history, geography, numismatics, and science. To his translations, which were noted for philological exactitude, he appended voluminous critical notes, which, by careful use of source material and a deep fund of personal knowledge, were often more valuable than the text itself. His fame as a teacher was enormous; Orientalists throughout Europe, came to study with him, and his pedagogical theories had widespread influence. De Sacy was a pioneer in the methodical study of Arabic and other Oriental languages, and so, by extension, enlarged the entire scope of modern historical scholarship. His principal works include: *Principes de grammaire générale* (1799); *Grammaire arabe* (1810); *Chrestomathie arabe . . .* (2d ed. 1826); *Exposé de la religion des Druzes* (1838).

SADDLE, a seat for a horse's back, contrived for the safety and comfort of the rider. In early ages the rider sat on the bare back of

his horse, but in course of time some kind of covering was placed over the back of the animal. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts and the flaps, of tanned pig's skin, and the construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles and side saddles for ladies. The name saddle is also given to a part of the harness of an animal yoked to a vehicle, being generally a padded structure by means of which the shafts are directly or indirectly supported. It is further applied to the support of a rod in machinery or of a spar of a ship.

SADDLE MOUNTAIN, Mass., the chief group of the Taconic Mountains, in the northern part of Berkshire County, four miles southeast of North Adams, and containing Greylock Mountain, the highest peak in the State, 3,535 feet in altitude.

SADDLE REEFS. During the process of folding an anticline the beds at the crest or apex of the fold sometimes tend to open or separate just as a pack of cards might do when bent sharply. If these openings become filled with mineral matter they form a special type of veins which are known as saddle reefs because of their saddle shape. Certain veins of the Nova Scotia gold field and of the Bendigo gold field in Australia are of this type.

SADDLEROCK OYSTER, a large and favorite kind of oyster originally obtained from a reef known as Saddle Rock near Norwalk Harbor, Connecticut. The supply was exhausted early in the last century, but in the first attempts at artificial cultivation of oysters (q.v.) in the eastern part of Long Island Sound many small "seed-oysters" were derived from that district, and so the name continued until it became a market term about New York for large and well-shaped oysters mostly sold to be eaten raw.

SADDUCEES, a sect or party of the Jews during the last three centuries preceding the fall of Jerusalem and the end of the old Jewish state (70 A.D.). The history of the party and the facts as to its constituency, beliefs and practices are only imperfectly known. The statements in Josephus and the New Testament, our most important evidence, are not altogether satisfactory. The New Testament writers may have been indirectly influenced by Pharisaic prejudice, while Josephus, writing to please and interest Greek and Roman readers, limits himself to a few somewhat general and not altogether consistent observations. In the New Testament the Sadducees are linked with the Pharisees as opponents of Jesus (Matt. xvi, 1, 6, 11, 12, etc.); they are said to have denied the resurrection of the body (Matt. xxii, 23ff and parallels), also the existence of angels or spirits (Acts xxiii, 8). As influential pri ts and members of the Sanhedrin the Sadducees officially opposed the early preaching of the Apostles (Acts iv, 1; v, 17). They sat side by side with Pharisees in the Sanhedrin or Supreme Council of Judaism (Acts xxiii, 6ff), although the two parties were hostile to each other.

Josephus ('War,' ii, 8, 14; 'Ant,' xiii, 5, 9; 10, 5f; xvii, 2, 4; xviii, 1, 2f; xx, 9, 1) tells us that the Sadducees did not believe in fate (i.e., Providence) nor in the immortality of the soul. They emphasized human free will and responsibility and were more austere and inclined to severity in judgment than were the Pharisees. They rejected tradition and held the written law alone to be authoritative. They belonged mainly to the more wealthy and aristocratic circles and were not influential with the mass of the people. Josephus, doubtless, knew more about the Sadducees than he set down in his writings. It must be remembered that the evidence of both Josephus and the New Testament holds good mainly for only the very last period of Jewish history when these Sadducees were only a shattered remnant of a once great and powerful party. There is no trace of any distinct parties in post-exilic Judaism until about 180 B.C. when the close contact with Hellenism consequent on the Seleucid supremacy over Palestine, led to an ardent Hellenizing propaganda and consequently to a cleavage of the Jewish community into two factions, the conservative and the radical or Hellenistic. But it is a mistake to identify the Sadducees with the latter, who were willing to sacrifice even the law itself in favor of conformity to Greek ideas and practices. The conservatives stood for steadfast loyalty to the law and Jewish customs and prejudices. But within the conservative ranks — which comprised th majority of the people — two tendencies were operative. Some, with loyal acceptance of the law and reverence for it as the supreme religious authority, were content with the Law as written. They opposed an accumulation of traditional interpretation as authoritative. Dogmas not explicitly taught in the Law might be refused assent. On the other hand were those who sought to make the Law ever more comprehensive and universally applicable through exegesis or interpretation. Such interpretations became an ever-enlarging body of *tradition* as binding as the Law itself. This was the party of the *Scribes* — ardent students of the Law — while the other tendency was mainly represented by the priests and aristocracy. The scribal position was essentially that Israel was fundamentally a *church* — a religious organization; the opposite position allowed full room for the conception of Israel as a political entity — a nation among the nations of the world. In the reorganization of the Jewish state under the Asmonean priest-princes (142–63 B.C.), the party of the scribes became definitely organized as the Pharisees. The group or party opposed to the Pharisees were known as the Sadducees, probably because so many of the Zadokites (i.e., the priestly aristocracy, cf. Ezek. xliv, 15f.) were among its influential members. There is no evidence, however, that these were so strictly organized as was the case with the Pharisees (q.v.). In general, the Asmonean rulers were inclined to favor the Sadducees. The Pharisees thus became the party of opposition.

The non-priestly aristocracy also generally sided with the government, that is, were counted as Sadducees. The numbers of this generally patriotic, conservative party were sadly diminished in the civil strife preceding the Roman occupation (63 B.C.) and in the wars between Herod and Antigonus, the last Asmonean prince. Its representation in the Sanhedrin was reduced and its hold on the people greatly dimin-

ished. In Herod's later years the party seems to have bettered its condition but it never again recovered its earlier power and influence. As a party it ceased to exist with the fall of Jerusalem, 70 A.D., and the complete disorganization of Judaism that ensued. The view advocated above is somewhat different from the traditional one which takes the Sadducees to have been, as a party, somewhat irreligious, inclined to Hellenism, worldly and with little reverence for the Law and sacred things in general. That some Sadducees were such is probably true, but it certainly is not correct to so characterize the party as a whole.

The Sadduciac type of thought is represented in Jewish literature by such works as Ecclesiastes in the Old Testament, by Ecclesiasticus and 1 Maccabees in the Apocrypha, and possibly by the Testaments of the XII Patriarchs and the Book of Jubilees in the Pseudepigrapha. A most interesting Sadduciac work, hitherto unknown to modern scholars, was recently discovered in the Cairo genizah by Dr. S. Schechter and published by him (Oxford 1910) under the title *Fragments of a Zadokite Work*. In this we have evidence of the existence of a reform party or sect within the Zadokite circle which originated about 200 B.C. and was still in existence, hoping for better things, as late as near the beginning of the Christian era, the date of the fragment.

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SADE, säd, **Donatien Alphonse François de,** COUNT, popularly called the MARQUIS DE SADE, French libertine and novelist: b. Paris, June 2, 1740; d. Charenton, Dec. 2, 1814. From the age of 14 to 26 he was in active military service until his return to Paris in 1766 when his immoral life became notorious. At Aix in 1772 he received the penalty of death for an unnatural crime and for poisoning, but escaped to Italy. Returning to Paris in 1777, he was rearrested and jailed in Aix, but again escaped only to be recaught and finally committed to the Bastile where he killed time by writing lewd novels and plays. These include *Justine* (1791); and *Juliette* (1798). He had the temerity in 1803 to address a copy of *Juliette* to Napoleon and was committed to the Charenton Lunatic Asylum where he had spent some time in 1789–1790, and there he died. "Sadism," the diseased condition of sexual perversion with cruelty, is named after him.

SADHS, sädz, or **SAADHS,** sä'ädz, a Hindu sect which believes in one God, and teaches a pure morality. The sect was founded in 1658 A.D. by a man called Birbhan. They have no temples, but assemble at stated periods in houses, or courts adjoining them. They are found chiefly in Farukhabad, Delhi, Mirzapore, etc.

SADI, să-dē', or **SAADI** (real name MUSLIH-UD-DIN), Persian poet: b. Shiraz, about 1184?; d. there, 1291. After completing his studies and spending many years in travel, he settled in the neighborhood of Shiraz, where he enjoyed the favor of several Persian rulers. The Persians esteemed him exceedingly on account of his golden maxims, which they consider a treasure of true wisdom, and also on account of his pure, simple and elegant style. His works comprise (1) a collection (*Diwān*) of lyric poems in the Arabic and Persian languages; (2) *Gulistān* (*Rose Garden*) (1258), a didactic work composed both of prose and verse, in eight books; (3) a work in verse, called *Būstān* (*Fruit Garden*) (1257), containing a collection of histories, fables and moral instructions. The complete works of Sadi were published in Persian at Calcutta (1791–95).

SADI-CARNOT, sä-dē'kär-nō. See CARNOT.

SADLER, săd'lĕr, or **SADLEIR, SIR Ralph,** English diplomatist: b. Hackney, 1507; d. Standon, Hertfordshire, March 30, 1587. He became the ward of Thomas Cromwell, was one of Henry VIII's principal secretaries of state and was appointed by Henry's will one of the council to assist the executors upon whom was laid the government of the country and the guardianship of young Edward VI. He went into retirement during Mary's reign, but emerged after the accession of Elizabeth, and became one of Cecil's agents, especially charged with negotiating Scottish affairs. In 1568 he became chancellor of the duchy of Lancaster and thereafter he was mainly occupied as one of the English commissioners to treat of matters relating to the queen of Scots. In 1580 he was for a time one of her guardians at Sheffield and Wingfield. His last mission was to James VI of Scotland in 1587 to endeavor to reconcile him to the execution of his mother.

SADLIER, Anna Teresa, Canadian author: b. Montreal, Que., 1856; d. Ottawa, Ont., 1932. As the daughter of Mary A. Sadlier (q.v.), she early came in contact with literary matters, most particularly with religious writings. This, in addition to her education at St. Mary's and Holy Cross Seminaries, and Villa Maria Convent, Montreal, directed her into writing, like her mother, on Catholic subjects. She contributed to almost every Catholic publication in Canada, the United States, and Great Britain, and wrote some 20 novels, two books of biography, and a score of translations from the French and Italian. Her novels were didactic, and later generations consider them dull, but there is a distinctive literary flavor in her biographical writing, most acceptable of which is *Women of Catholicity* (1885).

SADLIER, Mary Anne (Madden), Canadian author: b. Cootehill, County Cavan, Ireland, Dec. 21, 1820; d. Montreal, Que., April 5, 1903. She began her literary career while still a young woman by contributing to London magazines. When 24 she migrated to Canada, settled in Montreal, and two years later married James

Sadlier. He was a publisher, and this brought her further literary contacts, not only in Montreal but also in Boston and New York. Mrs. Sadlier was very devout, and spent much time doing editorial work for the Roman Catholic press. She made many English translations of French religious works, and in this helped expand the influence of her church. Her own most important religious book was *Purgatory: Doctrinal, Historical and Political* (1886). Despite this preoccupation with religious matters, she won popular approval with a series of romances of Irish life in America and Ireland, most effective of which was probably *The Confederate Chieftans, a Tale of the Irish Rebellion of 1641* (1859). In the literary circles of Montreal she met the Canadian patriot, Thomas D'Arcy McGee, whose poems she edited with a biography in 1869.

SADO, sä'dō, Japan, an island off the west coast of Hondo, opposite and 32 miles from Nügata, with an area of 336 square miles, and a coast line of 135 miles. It has a diversified surface culminating in Kimpokuzan, 3,820 feet high. South of Kimpokuzan is the town of Aikawa, near the east coast, with the ancient and still productive gold and silver mines in its vicinity, to which Sado owes its celebrity. On the west coast 18 miles distant from Aikawa is Ebisuminato, the port of the island. Pop. of island about 120,000.

SADOLETO, sä-dō-lā'tō, **Jacopo,** Italian theologian: b. Modena, 1477; d. Rome, Oct. 18, 1547. He was consecrated bishop of Carpentras, near Avignon, in 1517; belonged to the Contarini Reform party, and was a member of the commission appointed by Paul III to take steps toward effecting a Church reformation. He immediately opened a correspondence with Erasmus, Bucer, Sturm and Melanchthon, but when in 1539 he invited the Genevans to return to the Roman Catholic Church, he received a harsh rebuff from Calvin. After that he confined himself largely to his own diocese. He had been appointed cardinal in 1536, but while he was frequently summoned to Rome he preferred Carpentras, and his study, well-stocked with books of the new learning, in which he was an adept, being one of the Latinists of his day. He wrote commentaries on the Psalms, and on the Epistles of Saint Paul, and so excellent was their style that Erasmus made the somewhat invidious remark that "their very polish of expression will take off the edge of their pious suggestiveness." His works were published in four volumes in 1734. He was a diplomat in whom successive popes had confidence and acted as ambassador to Francis I in the interests of peace in 1544.

SADOWA, sä'dō-vä (Czech *Sádová*), Bohemia, a village near Königgrätz, on the Bistritz, remarkable as one of the hotly contested Prussian positions in the decisive battle of July 3, 1866, in which the Crown Prince of Prussia and Prince Frederick Charles commanding the Prussians defeated the Austrian forces under Benedek. This battle is known also as the battle of Königgrätz.

SADTLER, Samuel Phillip, American chemist: b. Pine Grove, Pa., July 18, 1847; d. Dec. 20, 1923. Graduated at Lehigh University in 1867 he later studied at the universities of Berlin and Göttingen. He was professor of natural science at Pennsylvania College in 1871–74; assistant professor of chemistry at the University of Pennsylvania in 1874–86, and professor there in 1887–91. He was professor of chemistry at the Philadelphia College of Pharmacy in 1878–1916; and from 1891–1923 was a consulting chemical expert at Philadelphia. He was chemical editor of the *Dispensatory of the United States* (1883–1923), and from 1900 was a member of the committee of revision of the *United States Pharmacopoeia.* Author of *Hand Book of Chemical Experimentation* (1877); *Industrial Organic Chemistry* (1891); and joint author of *Pharmaceutical Chemistry* (1895; 5th ed., 1917).

SAEMUND, sī'mûnd, **Sigfússon,** The Wise, Icelandic scholar: b. Iceland, about 1056; d. Oddi, 1133. He undertook a course of foreign travel in purusit of learning, and visited Paris and Rome; then, returning to Iceland, he became a priest at Oddi (1176). He was unknown to scholars till about 1643, when the newly-discovered *Elder Edda* and other writings were falsely ascribed to him.

SAFE, a strong and substantial receptacle for money, important papers and valuables, usually of iron or steel, or of both combined; sometimes with a filling of concrete to resist heat. A safe, to justify its name, should be proof against fire, explosives, acids, drills, wedges and the other implements and opening devices resorted to by burglars. The great majority of safes are designed mainly to preserve the contents from fire and to resist sneak-thieves. But the larger and most costly safes are built to safeguard the cash and securities of banks, trust companies, etc. The history of the progress of these strong safes is mainly a record of struggles between the burglar and the safe-manufacturer; the result is, that safes can now be obtained which are all but impregnable. With the modern safe of the best kind the lock may be said to be the only vulnerable point; hence much care and ingenuity have been expended on its mechanism. Numerous patents, mostly of American origin, have been introduced in recent years. Of these, the keyless permutation locks deserve particular mention, as they obviate the danger which arises from lost or false keys. Such locks allow of opening only after an indicator has been moved in accordance with a certain combination of numbers arranged before closing the safe. Some safe-locks are so constructed that to be freed they require different keys on different days, some can only be opened at a certain hour, this being fixed on before the door is closed; while others again require two or more keys in charge of different persons; in fact, the arrangement contrived to render the plundering of safes next to impossible are too numerous even to mention. The connection of safes with electric alarms in a variety of ways forms another safeguard. See Vault.

SAFE-CONDUCT, a security granted by the sovereign authority, or persons delegated by it, to strangers or other persons to enable them to repair to and return from a certain place undisturbed. In most of these cases passports have now taken the place of special safe-conducts. Sometimes the safe-conduct is given to

persons accused, to secure them against harm when summoned to an examination.

SAFE INDUSTRY. **History.**—Various methods for the safekeeping of treasure, jewels and other valuables have been in use since the earliest periods in history, and the advancement in this line has necessarily kept pace with increased wealth. Thus we have witnessed the evolution from the old-fashioned strongbox to the massive chilled iron and steel vaults, fire resistive and burglar resistive, until they have reached the highest degree of efficiency and perfection that science and skill can make them. Locks of rude construction were in use by the ancient Egyptians, and by the Romans, during the Middle Ages. The Chinese also used a lock similar in construction to the famous Bramah lock, invented in England in 1784. These were made of wood, the tumblers being of different length to fit the sizes of the wards in the keys. Beginning with the Middle Ages the inventive genius of man was turned toward providing something more substantial than a lock as a method of warding off the burglar, who at that time had not attained to the remarkable skill and cunning of the modern "cracksman," and indeed the professional thief of modern times would look back with envy on his predecessor who had nothing more than a mere wooden box, sometimes bound with iron, with which to cope. The first means of securing valuables was by placing them in some secret cavity in a wall, the door of which was opened by a spring or other device, but more often articles of household furniture were used, such as desks with secret drawers, or tables and chairs with false bottoms. These constituted the chests of the wealthy for some time and some of them were furnished with locks and bound with strips of iron, the whole very artistically made so as to ward off suspicion of their contents. The oaken chest or strongbox, reinforced with iron bands and knees, was in the beginning of the 18th century considered to be the best means of security. Such a chest was used in 1707 to guard the crown jewels of Scotland.

Prior to the 19th century the all-metal safe was unknown. The first improvement along this line was made in France about 1820, consisting of a metal box built within double walls, the space between being filled with a composition of non-conducting substances. A little later a so-called fireproof safe was constructed in New England, considered to be a vast improvement over the existing types. This safe had a body of solid oak plank from three to four inches thick, which, after being thoroughly saturated with alkali, was covered with sheets of thin iron. To make this more surely fireproof, bands of iron were crossed and recrossed over these plates and nailed down with large round-headed iron spikes. The great fire in New York in 1835 proved the worthlessness of these, several hundred of them being then destroyed. The idea of filling in the walls of a safe with non-conducting substances was first put into use in this country in 1843 by Daniel Fitzgerald. His idea was to fill the metal walls of the safe with plaster of paris because of its tendency to throw off heat, and having secured a patent on his invention he immediately began to manufacture a safe known as the "Salamander." His patent was later assigned to B. J. Wildey, who made a safe called "Wildey's Patent," the principle of these being to leave the space between the walls empty, trusting that the contents of the inner portion of the safe would be protected from heat by the non-conducting properties of the air. Other mixtures, such as asbestos, mixed with plaster of paris, clay, alum, fire clay, mica, and chalk, were then used to fill the vacant space, but none of these proved absolutely satisfactory. Today the modern safe walls are filled with a type of material which, when exposed to heat, will generate moisture or steam. Various water chamber devices have also been employed, with a view to maintaining a body of steam between the inner and outer shells of the safe when exposed to a hot fire.

Outside of the fire element, the most important part of the safe to be considered is the lock, for with our modern methods of fire protection the danger of burglary is often as great as possible loss by fire. The first supposedly non-pickable lock was the Bramah, but was finally proved to be valueless and easily picked, this being done by a Mr. Hobbs, by the "tentative process." Three other locks then came into use, the Chubb, also picked by Mr. Hobbs, the Pye lock, invented in 1851, but picked by Linus Yale, Jr., of Philadelphia, by the "impression process," and the Yale lock. Since then many new forms of locks have been invented, and the modern lock combinations are constructed in a manner which has made the trade of burglary extremely difficult.

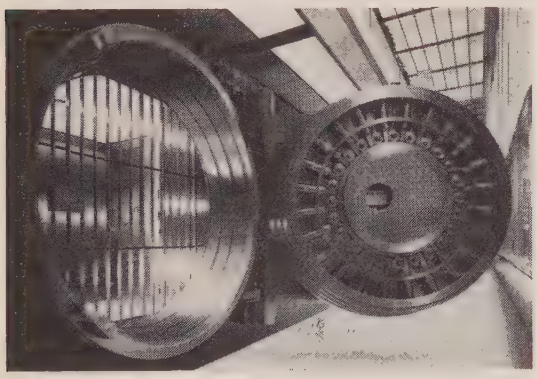
CONSTRUCTION

There are three ways of procuring security against burglary: first by the laminated construction; second, by the use of blocks of chilled iron, this method being more useful in the construction of large vaults than in the making of portable safes; and third, by the spherical chilled-iron safe. In the first method of construction the chamber is made of alternate layers of hard and soft plates of iron and of plates of hardened steel, the two laid alternately over each other in the walls of the chamber in such a way that they form a single mass. Thus the body of the safe, being constructed of alternate plates of iron, welded iron and steel, carbonized and decarbonized steel, and crystal steel, fastened together by means of bolts from the inside, has made safes practically impregnable to drills, jimmies, jackscrews and other devices. Another method of making safes, in common use by manufacturers, is to roll down together while hot into one solid sheet of tempered steel, three layers of soft iron or steel alternated with two intermediate layers of hard steel. These composite sheets, when they have been rolled until about one-half of an inch thick, are then built into the walls of the safe and alternated with plates of heavy steel about one-half inch thick. The doors are generally the weak point in the construction of a safe, for it is these which a burglar first attacks to see if there is any crevice into which a wedge might be inserted, or any crack into which nitroglycerine or any other high explosive might be introduced. In some safes the plates comprising the door are dovetailed, engaging with the corresponding parts of the jamb; in some an air-tight packing is used between the jambs and their abutments; while in others a screw door is used.

One solid mass of metal is used in the second and third types of safes, the tough and hard qualities of the metal being obtained by modern processes of steel making. The metal used is a soft sheet iron, the surface of which can be hardened by cooling. In the construction of many vaults, blocks of chilled-metal, weighing from three-quarters to several tons, are bolted together on

the inside, the sides being dovetailed together, and the outside surface is chilled to the highest degree of hardness. The door is a single casting of steel, two inches thick, and also chilled on the outside.

In the third type, the spherical, invented by William Corliss, the shell, constructed of steel from four to seven inches thick and chilled to a depth of about two inches, sometimes contains a "bugging" made from a special ore. This material, which is excessively hard and is in appearance somewhat like crystallized silver, is so interwoven with wrought iron rods that it can be battered with immense force without damage. The purpose of this construction of wrought and crystallized iron is to hamper a burglar in his work, it being supposed that in an attempt to drill through the walls of the safe, the drill will penetrate the soft metal more readily than the hard, and, consequently, working sideways, will be broken off when it strikes the hard metal. The "bugging" may, however, be used in precisely the opposite manner, the rods being made of the hardest tool steel and the body of the filling composed of cast iron segments, but the principle of turning the point of the "cracksman's" drill is the same. The cir-



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30-ton vault door in the Fifth Avenue office of the Manufacturers Trust Company, New York. On its two locks a new combination could be spun every minute for 380 years.

cular door is especially suitable for the spherical safe. They are closed after the manner of the breech block of a large gun, with an interrupted thread or screw.

In large banks and safe-deposit vaults there is no room sufficiently large to contain the number of individual safes which would be required to hold the enormous masses of money and other valuable securities with which these institutions are entrusted. This has turned the attention of the manufacturer in recent years to the building of large vaults which would be fire resistive and burglar resistive. The interior of these vaults may be constructed to suit the tastes and requirements of the owner, but the walls are now made much thicker than formerly and the builder has made more use of fireproofing materials. The most important feature of the modern vault is the lock, which has now reached the acme of perfection. The first form of lock used was the combination lock, an outgrowth of the "tumbler" lock, and the mechanism of these is very ingenious. These locks are not limited in the number of combinations upon which they may be set, and may be changed at any time should the combination become known to undesirable persons. The most valuable asset of the modern vault, however, is the chronometer, or time lock, the mechanism of which is as intricate and as complicated as the best watch, but at the same time it runs as true and as smoothly. To offset any possible disarrangement in the mechanism of a single clock, which would, of course, prevent the opening of the safe, three movements are usually enclosed in a single case. As these safes cannot be opened by any available agency until the time set for the clock to operate the mechanism which swings back the ponderous doors, it is obvious that the chronometer combination is the greatest safeguard against robbery which the bank can employ. The modern safe deposit vault is a vertical strong room, which could be broken into only by the aid of high explosives. See also Lock; Vault.

SAFED, sä'fĕd (Arab. Ṣafad), town, Israel, 2,700 feet above sea level. There is no mention of it in the Bible among the Galilean towns. It was a fortified place during the Crusades. In the 16th century it developed into a famous center of cabalistic studies and became one of the four holy cities of the Jews in Palestine. But at the establishment of the State of Israel in 1948 it had a population of 11,000 of whom two-thirds were Muslim Arabs, practically all of whom have been evacuated.

SAFETY VALVE. See Valve Terms.

SAFFARIDS, să-făr'ĭdz (Arab. Ṣaffārids), a Mohammedan dynasty reigning in Persia for over 40 years. Taking its name from the fact that its founder was, in his youth, apprenticed to a *ṣaffār,* or coppersmith, this minor dynasty has historical significance because it appeared as a national revival within Persia following the Arab invasion of the 7th century A.D., over 200 years earlier, and because it was the first real military challenge from its Muslim adherents to the temporal authority of the caliphate at Baghdad.

Ya'qūb ibn-al-Layth al-Ṣaffār and his three brothers grew up not far from Zaranj, then the chief town of the Province of Seistan, an area which today lies within eastern Iran and southwestern Afghanistan. Tiring of menial occupations, they gathered a robber band which gained dignity by association with the local warriors' guild, a loose grouping of volunteer forces. Eventually Ya'qūb was able to force the governor of the Tahirid dynasty to leave the province and in 861 he became commander of the local forces. Quickly taking over much of the area of present-day Afghanistan, including Kabul and Herat, he moved west toward the heart of Iran to seize the provinces of Kerman and Fars. By 873 he had captured both the Tahirid ruler and his capital, Nishapur. Alarmed by the rising power of this upstart, the caliph found it expedient to name him amir, or governor, over the area of his conquests. Still unsatiated, Ya'qūb marched toward Baghdad but his force was defeated in battle and he retired to the east to consolidate his holdings. Ya'qūb died in 879. A man of very simple habits and tastes, his major interest was in creating an army personally devoted to him. All matters of administration were concentrated in his own hands and, as a result of this policy and the power of his military machine, he left a vast treasure.

'Amr, a brother of Ya'qūb, was proclaimed

the latter's successor by the army. He hastened to tender his submission to the caliph who appointed him governor over the territories ruled by Ya'qūb. His career was a stormy one for he was alternately in and out of favor with the caliph and experienced the relentless enmity of the Tahirids, in spite of the fact that he dwelt in their former capital and was much the stronger. In 898, 'Amr received a decree from the caliph which granted him authority over the vast area of Transoxiana (northeast of the Amu Darya) in place of the current holder, Ismā'īl the Samanid. However, this authority had to be established by force; in the campaigning that followed, his army was beaten and in 900 'Amr himself was taken prisoner. Weak and fallen, he was sent to Baghdad where the caliph had him executed in 902.

For the next decade four descendants of Ya'qūb and 'Amr struggled to maintain authority over a constantly shrinking territory and some years later two other members of the family exerted limited power until about the middle of the 10th century when the line vanished from history.

As military despots of brief authority, comparatively little historical material is available regarding the functions and operations of the Saffarid state. It is known that there were three separate treasuries: that of land revenue was expended for the upkeep of the army; the income from royal holdings supported the court; and auxiliary sources of income were distributed as monetary rewards for services rendered. These hectic years were part of a longer period when local dynasties were waxing and waning, each struggling with one or more of its neighbors. As one among this number the Saffarids should be singled out for their revival of national consciousness and national spirit and for their interest in Shī'ism, the Muslim sect that was destined to win all Iran in a later century.

DONALD N. WILBER.

SAFFLOWER, a large thistle-like composite plant (*Carthamus tinctorius*) with orange-colored flowers, said to have been originally brought from the East, but now naturalized in many parts of Europe and extensively cultivated. The tubular flowerets are collected, dried and used somewhat as a feeble laxative medicine, in place of, or as an adulterant of, saffron. They are, however, chiefly important as the source of carthamin, a dyeing principle originally much employed by the Chinese and later by Occidental silk manufacturers, as it gives brilliant, although fugitive, red tints; mixed with French chalk it forms the cosmetic rouge. In Spain the flowers are used to color soups and other dishes. The Jews in Poland are remarkably fond of the flowers and mix them with their bread and most of their viands. Oil, in India, is expressed from safflower seeds, for culinary and lighting purposes.

SAFFORD, Truman Henry, American mathematician and astronomer: b. Royalton, Vt., Jan. 6, 1836; d. Newark, N. J., June 13, 1901. He was early known as a calculator of great skill; in 1845 he prepared an almanac; by a method of his own he abridged by one fourth the task of computing the rising and setting of the moon, and after his graduation from Harvard was officially connected with the observatory there, 1854–1866. In 1865 he was appointed professor of astronomy in the University of Chicago and director of the Dearborn Observatory; in 1874–1876 he was a member of the United States Coast Survey, and in 1876–1901 professor of astronomy in Williams College. He studied the nebulae, discovering many new ones; computed cometary and planetary orbits and for some time devoted his attention to latitude and longitude work for the United States Corps of Engineers, for which he prepared a star catalogue. Among his further published writings were a catalogue of polar stars, *Mathematical Teaching and its Modern Methods*, and numerous contributions to astronomical journals, to the *Proceedings* of the American Academy, and to the notices of the Royal Society.

SAFFRON, a bulbous autumnal plant (*Crocus sativus*) and a commercial dyestuff obtained from it. The cultivated saffron originated probably in the Levant, and was grown in early times about the town of Corycus, Cilicia (from which the *Crocus* genus may have taken its name). The Arabs cultivated it in Spain about the 10th century, and it was an important crop in England, especially about Saffron Walden, Essex, in the 15th century, bringing the highest market price. It is now raised about the Mediterranean and in Asia. The saffron is low, with the grass-like leaves and long-tubed, funnel-shaped flowers, springing directly from the ground, which are characteristic of the crocuses. Its flower is purple, with a style tipped with three orange-colored stigmas, each more than an inch long, extending from one side of the perianth. These stigmas are picked off in the early morning and dried on a kiln, either loosely or between layers of paper, and under the pressure of a thick board which forms the mass into cakes, about 4,000 of these stigmas being necessary to give an ounce of saffron. In either case the commercial saffron is liable to suffer from adulteration. This adulteration was so prevalent at one time that those guilty of it (when caught) were killed.

Saffron stigmas, when genuine, have a characteristic orange red color and an aromatic, bitter odor and taste. The substance has faint carminative and narcotic properties, but is seldom used medicinally, except for coloring tinctures and occasionally as a diaphoretic in the eruptive diseases of children. In the *Song of Solomon* the saffron is mentioned among the sweet-smelling herbs, and it was much in demand among the Greeks and Latins for its perfume. A fragrant essence was made from it with water and wine for sprinkling in theaters and other places, even in the streets, for anointing the hair and for the bath. Saffron was also much employed in culinary operations, chiefly for its aromatic taste and for coloring, as the clown in the *Winter's Tale* says he "must have saffron to color the warden pies."

Saffron, however, is most commonly used as a dye, giving a yellow hue to cloth, but it is being displaced by cheaper colors. This tint was in very early times the royal color in Greece, and was that of some of the women's court robes, but afterward appropriated by the hetairae. In Ireland and the Hebrides it was also the color of the king's mantle and of the shirts of persons of rank. Saffron enters largely into the composition of the sacred spot

on the forehead of a Hindu pundit. An extract made from saffron, used as a glaze on tinfoil, imitated gold in mediaeval illuminations, and was also employed by painters.

HELEN INGERSOL.

SAG HARBOR, village, New York, in Suffolk County; at sea level; on Gardiners Bay, an inlet from the Atlantic Ocean; 99 miles east of New York; on modern highways. Situated in a farming section, with diversified crops and a large potato acreage; it has also various industries, including watch cases and knit goods; and is a famous summer resort, with fine bathing beaches, and a harbor affording excellent anchorage for yachts. There are a public library; and a whaling museum, containing a collection of equipment used in the trade. The Masonic Temple is a beautiful building, dating from 1845, and reflecting in its architecture the Greek influence of the period; and there is a whalers' monument, erected to the memory of the men lost at sea in the days when Sag Harbor was an important whaling port. The height of the whaling activity here was between 1840 and 1860, when the fleet numbered about 70 vessels. It has a mayor and board of trustees. Pop. (1940) 2,517; (1950) 2,373.

SAGA, city, Japan, capital of the prefecture of Saga, on the island of Kyushu, 43 miles northeast of Nagasaki. It is a minor seaport and commercial center. The town is intersected by numerous streams, chief of which is the channel of Sentonofutsi, 50 miles long. It unites the Gulf of Shimabara with the Northern Sea, and is of some importance as a manufacturing center and also as a distribution point for coal, camphor and rice. There are cotton mills and ironworks. Saga was formerly the capital of the feudal province of Hizen, which comprehended the present prefectures of Nagasaki and Saga. Pop. (1947) 64,978.

SAGA. The word saga is cognate with German *sage,* "a short tale," with which, however, it must not be confounded in meaning, and with English *saw,* "saying." In its limited and original meaning and without qualification, a saga is a story or group of stories in prose, of an historical character, relating in a series of episodes the whole life-history of a Scandinavian hero and written down in Norway or, mainly, in Iceland during the Middle Ages. The historical events which the sagas narrate took place mostly in the period which extended from the date of Iceland's settlement in 874 to the middle of the 11th century. That was the heroic age of the Icelandic people. At first the sagas were nothing but oral transmissions from one tale-teller to another. Their composition began about the middle of the 12th century and lasted for about 100 years.

In a wider sense the word saga is applied to any narration of events of the past, mythical as well as historical in character, but possessing the traits of the genuine saga. In these tales some legendary champion, from whom the saga takes its name and around whom the important events are centered, is the hero. Heroic achievement and marvelous adventure, fact and fancy, are mingled freely. In the course of generations the saga undergoes important changes, acquires accretions and takes on a more or less poetic and artificial character. Finally it is consigned to writing and handed down as a kind of rudimentary epic. When applied, as they frequently are, to works of that kind, in which the historic element is found in greater or less degree, the words saga, myth, legend, Märchen, epopee and epos are used without clear distinction of meaning.

In the third and last stage of its development, the word saga has come to mean any free creation of the popular fantasy, sometimes incredible or even burlesque in character. Here the historical element is entirely lacking. In its widest sense, saga is sometimes used to include the entire body of the history and mythology of a people, or their literature or some division of it: hence we read of the Norse, German, Irish, or Greek sagas; of saga poetry, saga cycles, heroic sagas, beast-sagas, the Cuchulainn saga, the Karl saga, the Njals saga. In Norse mythology Saga is also the name of a goddess.

The Icelandic sagas may be classified: (1) geographically, according to the part of the country in which they arose or in which their scenes are located; (2) as major or minor sagas, the latter being more distinctly local in character and simpler in plot and interest than the former; and (3), as here, as (a) historical, (b) mythical, or (c) romantic. To the class of historical sagas belong: The well-known *Landnamabók, Book of Settlements* which contains a list of all the notable men who, up to 930, settled in the island. It contains much that is valuable on the religion, laws and customs of the people. It is preserved only in a version dating from the 13th–14th century. The *Islendingasögur,* which embody the lives and achievements of celebrated Icelanders and the fortunes of great Icelandic houses from 950 to 1130. The *Biskupasögur* are biographies of Icelandic bishops who flourished in the 11th and 12th centuries; they constitute an ecclesiastical history of Iceland, of less literary interest than the secular sagas but of the utmost historical value.

It would be difficult to say how much is to be regarded as authentic history in *Nóregs Konungasögur,* also called *Heimskringla, World-Circuit,* from the words with which it opens. This was the work of the greatest of all Icelanders, Snorri Sturluson, who was born in 1178 in West Iceland and became distinguished as statesman, scholar, poet and sagaman. It was written about 1230 and gives the history of the kings (chiefly) of Norway. The Icelanders never lost the feeling of connection with the motherland with which their country was in close relations especially in the time of Harald Hárfagri, when Iceland was settled, and of Olaf Tryggvason, when it was converted. The *Heimskringla* possesses all the most excellent features of the best saga art. At about the same time the *Gudhmundarsaga Dyra* was written. Of historical importance also is the *Sturlungasaga,* "the history of Sturla," which is a collection of later *Islendingasögur,* telling of events which happened as late as the year 1250. The tales belonging to this saga arose in West Iceland about the beginning of the 14th century and contain some of the finest narrative passages in the whole body of Icelandic literature. The *Thordharsaga Sighvatssonar* treats of Icelandic history up to the same period. The mythical sagas are those that treat of the old heroic legends, some of which, like the *Völsunga Saga,* which is a prose rendition of the Nibelungen story as given in the Eddic lays, are the common property of all the German peoples, while others,

like the 'Frithjofs Saga,' is particularly Scandinavian.

The 'Fornaldarsögur' "Tales of the Past" deal with the early history of Iceland and are partly of a fairy and romantic character, telling of Viking voyages, love adventures, battles with berserker and monsters. The romantic sagas, as, for example, the 'Riddarasögur,' are mostly translations or adaptations of foreign (chiefly French) courtly epics and romances of chivalry, such as the tales of Troy, of Alexander, Charlemagne, Arthur and the Round Table, Barlaam and Josephat. They were reduced to writing in the 13th century and became favorites in the 15th. They are purely literary and have no historic value. Besides these, which are the three principal classes of sagas, there is a kind called Thättr, which is a short tale treating of a single episode in the life of a distinguished Icelander, and the simplest form of saga. There are also sagas dealing with the Faroes, the Orkneys, Norway, Denmark, Greenland and America. Among the minor sagas may be mentioned 'Gísla,' which is perhaps the most tragic of all the sagas, or at any rate the most conscious of its tragic aim; 'Gretis Saga'; 'Bandamannasaga' ('The Confederates'), which, quite exceptionally, is humorous and the first comedy in western Europe; 'Kormákssaga,' which is very romantic; 'Eríkssaga Raudha' ('The Saga of Erik the Red'), which tells of the discovery, in 982, by Erik, of Greenland and Vineland; his son Leifr discovered the North American coast, probably Nova Scotia; 'Bjarnarsaga,' 'Heidharvígasaga,' 'Víga-Glúmssaga,' 'Vápnfirdhingasaga' and 'Hrafnkelssaga Freysgodha,' which belong to the 12th century; 'Gunnlangssaga' and 'Flóamannasaga,' which were composed in the 13th century; and 'Hítdælakappa,' 'Hænsna Thórissaga,' 'Hardharsaga,' 'Grimkelsson,' 'Gullthórissaga, 'Fóstbrœdhrasaga,' 'Vatzdœlasaga,' 'Svarfdœlasaga,' 'Valla-Ljótssaga,' 'Ljósvetningasaga,' 'Reykdœlasaga,' 'Thorsteins-Hvíta' and 'Droplaugarsonasaga.'

The following four are the greatest of the Icelandic sagas: (1) The 'Eyrbyggjasaga,' which covers a period of about 140 years (890–1030) and was written probably by a cleric about 1225. It is remarkable for the great variety and richness of its adventure and for the light it throws on the manners and customs of the period. Its style is serious, measured and realistic. (2) The 'Egilssaga,' which takes its name from that of the skald (poet) Egill, portrays the life of the 9th and 10th centuries. As his sources, its author made use of oral traditions, other saga material and Egill's own poems and put the whole into writing about the year 1200. (3) The 'Laxdœlasaga' is, for the modern reader, the most romantic and one of the most attractive sagas. The incidents took place between 910 and 1026, and the scene is laid among the people of Laxátals in West Iceland. Here, too, the author, who was also probably a cleric, made masterly use of his sources, some of which may have been Irish, both oral and written. (4) The saga universally recognized as the ripest and most brilliant product of the saga-art is the 'Njálssaga.' It is composed of two originally independent sagas, those of Gunnar and Njál and belongs to the south of Iceland. It is designed on the most liberal scale and is remarkable for the masterly way in which its plot, full of intrigue, love and hate, has been handled, and for its character-drawing and simple and effective style.

In Iceland and Ireland, more than anywhere else in western Europe, story-telling was a necessary part of every assembly. The professional sagaman wandered from place to place, told his stock-in-trade, received entertainment and rewards in return for them and gathered material for new stories. These tales, both those of an historical and those of a legendary character, being of oral transmission, even when later they were thought fit to be consigned to writing, always used the oral saga as a background. Almost all the events narrated in them took place between the years 950 and 1030. That was the Saga Age of Iceland, when life, in a material sense, was almost barbarous and factional fights were of frequent occurrence. The sagaman made most of the abundant stuff at hand for heroic narrative. His heroes are represented as being almost more than human men and women. They belong, for the most part, to the ruling class. The author gives a short account of the hero's family, of his youth and manhood, his loves, friendships and enmities, his great deeds and his death, which was usually of a tragic character. Being based almost entirely on actual happenings and being in close relation to the lives of those for whom they were recited or written, the sagas convey a wonderfully faithful picture of life not only in the Scandinavian world during those centuries but also among the other Germanic peoples who once lived in similar circumstances but have left no such record of their own past.

The very language in which the sagas are couched is greatly conducive to the appearance of reality. It is in prose and very often in the form of dialogue. As the sagaman's main object was to move his hearers, he told his tales in unaffected, straightforward language, the everyday language of the people. Like a dispassionate observer, showing no sympathy with either the events or their heroes, he was content to assemble the incidents and to relate them briefly and restrainedly. The result, however, is much more than a mere impersonal folktale. Even at that early date it is surprising how clearly the essential rules of all good story-telling seem to have been fixed and were observed to perfection; dramatic irony and suspense; the orderly, steady progression of the scenes; the recurrence of personages familiar from other sagas, the chief figure in one becoming a subordinate character in another; the incidental mention of unheroic "mean" details; all this adds to the interest of the saga. One thing the Icelandic sagaman — like the contemporary Irish *sgéulaidhe* — could do supremely well, and that was to tell a story. The Icelandic sagas stand apart at once as a notable phenomenon in literary history and as an absolutely independent creation of the northern mind. See ICELANDIC LITERATURE.

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SAGARD-THEODAT, Gabriel, French Catholic missionary: b. 16th cent. He labored in converting the Huron Indians to Christianity during the 17th century and contributed in an important degree to a knowledge of Canada in its early colonial days as «New France.» His principal works are 'Travels to the Huron Country, towards the Freshwater Sea and the Uttermost Limits of New France, called Canada; Wherein is Treated of all Matters touching the Country, the Manners and Character of the Savages; their Government and their Ways, as Well in their Own Country as when Roaming; of their Faith and Belief; with a Dictionary of the Huron Language' (1632); also 'History of Canada and the Journey Made by the Friars Minor Recollects Thither, for the Conversion of Unbelievers' (1636). An edition of his works was published at Paris in 1866.

SAGASTA, sä-gäs'tä, **Praxedes Mateo,** Spanish statesman: b. Torrecilla de Cameros, 21 July 1827; d. 5 Jan. 1903. He studied at the College of Engineers in Madrid; practised as an engineer in Valladolid and Zamora; in 1854 was elected from Zamora province to the Cortes, where his attitude was a radical one. In 1856 for participation in an unsuccessful revolt he was compelled to escape to France. Upon the proclamation of amnesty he returned, became professor in the Madrid College of Engineering, re-entered the Cortes, was identified with the Progressive minority and edited its journal, *La Iberia.* After the outbreak of 22 June 1866 he again fled to France, but at the beginning of the revolution of 1868 was once more in Spain, where he became Minister of the Interior in the provisional government. In October 1871 he was chosen to the presidency of the Cortes; in December he entered the Malcampo Cabinet as Minister of the Interior; in February 1872 was commissioned to form a new ministry, but in May was forced to resign. In 1874 he appeared anew in office as Minister for Foreign Affairs in the Serrano Cabinet, but shortly afterward exchanged his portfolio for that of the Interior, and in August became president of the Ministry. He retired from office at the accession of Alfonso XII; for a time was a leader without a party; as a member of the Cortes was finally associated with Martinez Campos (1881) in the organization of the new Liberal party, and upon the overthrow of the Conservatives became president of the Ministry. He was forced from power in 1883. Subsequently he was president of the Cortes in 1883–84 and of the Ministry in 1885–90 and 1892–95. In September 1897 he was again summoned to form a cabinet. He recalled Weyler from Cuba, appointed Blanco captain-general and drafted a plan for Cuban autonomy. Although opposed to the war with the United States he waged it with such efficiency as his limited resources would permit and was loudly denounced for signing the treaty of peace. On 4 March 1899 he resigned with his entire cabinet, though on 6 March 1901 he again took the helm and, after averting a Carlist insurrection, remained in office until 3 Dec. 1902. He has been characterized as «singularly devoid of the blind arrogance which has been the bane of so many Spanish statesmen.» After Canovas' death he was conceded to be the greatest political figure of Spain.

SAGE, sāj, **Henry William,** American philanthropist: b. Middletown, Conn., 13 Jan. 1814; d. Ithaca, N. Y., 17 Sept. 1897. In 1832 he engaged in the lumber business which he conducted until 1854, settling at Ithaca, N. Y. He entered the New York assembly in 1847. His earlier benefactions were the endowment of various schools and churches, the West Bay City, Mich., public library, and the Lyman Beecher lectureship at Yale College. In 1870 he became a trustee of Cornell University and his various gifts to that institution were $266,000 for the Sage College for Women; $200,000 for the Sage School of Philosophy; $50,000 for the Susan Lynn Sage chair of philosophy; $260,000 with an additional endowment fund of $300,000 for the University Library Building; $20,000 for the Museum of Classical Archæology; $11,000 for the Sage professorship of philosophy; $300,000 for floating indebtedness. His careful management of timber lands owned by the institution realized for it about $6,000,000.

SAGE, Russell, American capitalist: b. Verona Township, Oneida County, N. Y., 4 Aug. 1816; d. Lawrence Beach, L. I., 22 July 1906. He began life as clerk in his brother's grocery store; entered the retail grocery business for himself in 1837, and during 1839–57 was a wholesale grocer at Troy, N. Y. He was alderman of Troy in 1841–47; treasurer of Rensselaer County, and a Whig member of Congress during 1853–57. In 1863 he removed to New York and shortly began large operations in railroad and other securities. He accumulated one of the largest fortunes in America and was director in many large corporations.

SAGE, Russell, Mrs. (MARGARET OLIVIA SLOCUM), philanthropist: b. Syracuse, N. Y., 8 Sept. 1828; d. New York, 4 Nov. 1918. She was the daughter of Joseph and Margaret Pierson (Jermain) Slocum, and after early vicissitudes graduated at the Emma Willard Seminary at Troy, and became a school-teacher. She taught in schools at Philadelphia, Syracuse and Troy, until at the age of 41 she became the wife of Russell Sage (q.v.), a grocer at Watervliet (then West Troy). Their home life continued simple, in spite of the great wealth which they accumulated, and Mrs. Sage took such deep interest in her husband's affairs that five years before his death he turned over to her complete control of his business and found that his faith was borne out by her successful operations. After his death her life was largely devoted to benevolent work and during the last seven years of complete stewardship of the $70,000,000 left by her husband, she returned nearly $30,000,000 to the public by systematic philanthropies.

SAGE, William, American novelist, son of Abby Sage Richardson (q.v.): b. Manchester,

8 May 1864. He was educated in France and Germany, was engaged in railway and banking business 1881–96, and since then has given his attention to literature. He has published 'Robert Tournay' (1900); 'The Claybornes' (1902); 'Frenchy — The Story of a Gentleman' (1904); 'The District Attorney' (1905); 'By Right Divine' (1907); 'A Maid of Old Virginia' (1915); 'La Belle Yseulte' (1924).

SAGE, a name covering both the common garden herb (*Salvia officinalis*) and other plants of diverse families, somewhat resembling it in color or odor. The cultivated sage is a mint, and the genus differs from the majority of labiates in having two stamens instead of four. It is a native of southern Europe, a shrubby perennial of hoary aspect, bearing rough, wrinkled, gray-green, opposite leaves, on the decumbent stems, and pale-blue, streaked flowers in verticillate spikes at the extremities of the branches. It has been widely cultivated, for at least three centuries, on account of its aromatic odor and bitter, pungent taste. It was formerly used in medicine, having slight tonic, stimulant and astringent properties. An infusion of the plant, or "sage-tea," was drunk in England before the advent of Chinese tea, was a favorite remedy for colds and is even now employed as a gargle. An old English proverb states that "He that would live for aye must eat sage in May." See HERBS, CULINARY.

Many salvias, or sages, are frequently cultivated for their brilliant flowers. The most common, perhaps, are the scarlet sage or salvia (*Salvia splendens*) with racemes, perhaps a foot long, of slender flowers two inches long, arranged in whorls, both calyx and corolla being of a most brilliant scarlet hue; and the equally large-flowered but blue-tinted *S. patens.* The woolly white foliage of *S. argentea* has caused it to be included in gardens, and there are a score of others quite worthy of cultivation for ornament.

Several genera of the *Chenopodiaceæ,* a family which takes kindly to alkaline soils, and which inhabit the desert regions of western North America, are called salt white, or silvery sages. Bitter sages are composites, and are more commonly known as sage-brush (q.v.). The salt sages are species of *Atriplex,* living on thousands of acres of waste lands, which are strongly impregnated with alkali, and so dry that little other vegetation can exist. Since water is so scarce in certain of these alkali deserts, stock cannot be taken into them in summer, and the sages make a good growth, the fruits, valuable for their nutritive qualities, become ripened and the leaves "sun-cured," which, together with the tender spring shoots, make excellent forage, particularly for sheep. The flocks are taken in in winter, when the snow furnishes water for them, and eat the salt-bushes greedily, Nuttall's sage (*A. nuttallii*) being the most valuable, as it is perennial with a deep, woody root, and although cropped, seeds and all, quite down to the ground, survives and starts up again, during the summer, when it is undisturbed. In fact, the constant cropping of these pastures, and the constant manuring, are improving the winter ranges, which are thus becoming nearly as valuable as the summer ones. The white-sage or winter-fat (*Eurotia lanata*) is another highly prized winter forage plant, a foot or more high from a shrubby base, whitened with long hairs, perennial and with abundant fruit, that contributes largely toward the great fattening qualities attributed to this sage, which is also supposed to have a beneficial effect on the grazing stock. The shad-scale, a spiny, shrubby salt-sage (*Atriplex confertifolia*) produces in the spring tender shoots and thick succulent leaves and enormous quantities of flat, winged seeds. These are eagerly sought at the time, and, in the autumn, when leaves and fruit have dropped and been blown into hollows of the plain, the sheep seek them out and devour them utterly.

HELEN INGERSOLL.

SAGE-BRUSH, any one of the species of the genus *Artemisia* — composites very abundant in the arid, alkaline regions of the western United States, where the soil is not too saline, and, with other desert vegetation, covering immense areas. The best-known sage-brush is the common shrub, or bitter-sage (*A. tridentata*), which is found growing on the plains and ascending to the sub-alpine parts of the mountains. It varies in different situations from a dwarfed shrub to almost tree-like proportions, when its trunk near the ground will measure nearly a foot through, being twisted and knotty and loosely enveloped in a light-gray, shreddy bark.

SAGE-BRUSH STATE, or **SAGE-HEN STATE,** a nickname for the State of Nevada, from the large amount of sage-brush growing there.

SAGINAW, Mich., city and county-seat of Saginaw County, on the Saginaw River, 16 miles from Saginaw Bay, 97 miles northwest of Detroit and 65 miles northeast of the capital at Lansing. The railroads entering the city are the New York Central, the Pere Marquette and the Grand Trunk Western. It is also served by a regular air line and by numerous passenger bus and motor freight lines. The city, built upon both banks of the beautiful Saginaw River, here spanned by several highway and railroad bridges, lies at the head of deep-water navigation communicating with the Great Lakes. One of the great cities of the state, it is a city of great beauty and attractiveness; has an ideal climate without extremes of heat or cold, has many handsome residences and ranks well with any city of the United States in the percentage of fine modern homes owned by its residents. Situated on United States highways 10 and 23 and surrounded by an excellent state road system, it is a central point of tourist travel in the state.

Industries, Manufactures, etc.—Industrially the city is fortunate in possessing an immense supply of hydroelectric current, and being the center of the bituminous coal fields of Michigan. Lumber, sand quarries and salt wells also abound, and a productive sugar-beet region is cultivated. Saginaw was at one time the center of the white pine industry, and millions of dollars worth of logs have been floated on the river. This vast industry, through deforestation, has given way to manufacturing, and the city is now distinctively a manufacturing and jobbing center. The principal manufactures of the city are automobile parts, machinery, foundry and iron products, furniture

graphite products, rules and tapes and boilers. About 18,000 persons are employed in industry.

Municipal Conditions.—Ample banking facilities, a city-manager-council form of government since 1936, moderate tax rate, modern civic services of all kinds and other municipal improvements, over 80 churches, are evidence of healthy civic development and growth. Saginaw has a school system which has set and kept pace with other communities. The public and the Hoyt libraries are well-equipped institutions. The hospitals are the Saginaw General Hospital, St. Mary's Hospital, St. Luke's Hospital, and the Saginaw County Contagious and Tuberculosis Hospital. Of interest to visitors are the Woman's Club Building, the statue of Little Jake Seligman, a self-erected memorial to a prominent clothing merchant of the 1890's, the Federal Building, the Hoyt Library (already mentioned), Hoyt Park, Ezra Rust Park, the Butman-Fish Memorial Library, and the Old-Musee-Schuch Hotel, one of the oldest hotels in the state, with its collections of Indian relics, early Americana, and various art objects.

History and Population.—The earliest white men to reach and explore the Saginaw Valley were French Canadians. A fur-trading post was built where the city now stands in 1816 by Louis Campau. In 1818 a council-house was constructed by Campau at the instance of Governor Louis Cass and here on Sept. 24, 1819 the Treaty of Saginaw was concluded between Louis Cass and the Chippewa Indians, which ceded extensive tracts of land to the United States. Fort Saginaw was then built on the west bank of the river, and unrest among the Indians led to the stationing of soldiers there in 1822. The winter of 1822–1823 was so severe that the commander advised that the post be abandoned and in mid-summer 1823 following a fever epidemic the post was abandoned. The settlement grew slowly in the decade that followed and its activities were centered in the fur trade. In 1837 Saginaw was incorporated as a village. The lumber trade brought prosperity to the place and by 1857 there were 14 steam sawmills operating along the Saginaw River. The lumber industry gradually declined with the depletion of the forests but the loss to Saginaw was in great part offset by the discovery of great deposits of bituminous coal, which had been unearthed by salt drillers. In 1890, Saginaw County was the leading coal field in the state. The present city is a consolidation of old Saginaw City, East Saginaw and the village of Salina or South Saginaw. The latter was incorporated as a village in 1866 and became a part of East Saginaw in March 1873. East Saginaw was incorporated as a village in 1855 and as a city in 1859. Saginaw City was incorporated as a city in 1857. The two municipalities, East Saginaw and Saginaw City, long traditional rivals, were consolidated by act of the legislature of 1889 into the city of Saginaw, and the first meeting of the common council of the consolidated city was held March 12, 1890. The population of the city is cosmopolitan in character. For many years the Germans predominated, as attested by their many societies of an educational and social character. Later comers were the Irish, French, Poles and Bohemians. Negroes and Mexicans were imported later, the latter to work in the beet fields. The Mexican group has dwindled due to labor competition from the Negroes and also to deportations. A new city charter was adopted by the city in 1936. It is of the city-manager-council form of government and has attracted wide attention from students of city government. In 1950 the city had a population of 92,918.

SAGINAW, a river in Michigan which is formed by the junction of the Flint and Shiawassee, and flows nearly due north into Saginaw Bay. The main stream is only about 20 miles long, but with its branches it drains a large portion of the lower peninsula. It is navigable to the city of Saginaw, 16 miles.

SAGINAW BAY, the largest inlet of Lake Huron on the coast of the United States. It indents the east coast of the lower peninsula of Michigan. It is about 60 miles long and from 20 to 30 miles wide. It is a safe harbor and never dangerously rough, although it is sometimes subject to storms. The color of the water in the bay is brownish-green.

SAGITTARIA, săj-ĭ-tā′rĭ-ą, a genus of plants of the water plantain family (*Alismaceae*). It is a widely distributed genus, wholly or partly aquatic, native to the temperate zones and the tropics. The species are handsome, with lancelike, elliptical or arrow-shaped leaves, erect or floating; the flowers are verticillate in threes around the upper part of the scapes that carry them well above the water, and are three-parted, with beautiful white and crinkled fungacious petals. The common arrowhead (*S. latifolia*) grows in the mud along rivers and ditches, and is very ornamental with its charming whorls of flowers rising from the center of a cluster of large, erect, sagittate leaves, varying surprisingly in different plants in respect to size and shape. It is a perennial, with thick fibrous rootstocks, which produce oval, fleshy tubers, often as large as a hen's egg, abounding in starch, and a staple and nutritious article of food with many Indian tribes. The squaws sometimes waded into the mud where the arrowheads grew thickly, loosened the tubers with their toes and when the plants floated to the surface captured them and flung them into canoes, to be boiled or roasted. *S. chinensis* is cultivated in China for food.

SAGITTARIUS, săj-ĭ-tā′rĭ-ŭs, *in astronomy,* a southern constellation south of Aquila and partly in the Milky Way consisting of eight visible stars. It is represented on celestial globes and charts by the figure of a centaur shooting an arrow from his bow. *In astrology,* the ninth sign of the zodiac.

SAGMULLER, Johannes Baptist, German ecclesiastical historian: b. Winterreute, Württemberg, Feb. 24, 1860. He was educated at the Latin School of Mergentheim, the Ehingen High School and the Seminary of Tübingen. He was ordained to the Roman Catholic priesthood in 1884; was curate at Alpirsbach in 1884–1887, and tutor at Tübingen Seminary in 1887–1893. He was special professor of history in 1893–1896 and after 1896 was professor of canon law and pedagogics at the University of Tübingen. His published works include *Die Papstwahlen und die Staaten von 1447–1555* (1890);

Die Papstwahlbullen und das staatliche Recht der Exklusive (1892); *Zur Geschichte des Kardinalats* (1893); *Die Tätigkeit und Stellung der Kardinäle bis Papst Bonifaz VIII* (1896); *Die Entwicklung des Archipresbyterats und Dekanats bis zum Ende des Karolingerreichs* (1898); *Lehrbuch des katholischen Kirchenrechts* (1904; 2d ed., 1909); *Die kirchliche Aufklärung am Hofe des Herzogs Karl Eugen von Württemberg* (1906); *Die Trennung von Kirche und Staat* (1907); *Wissenschaft und Glaube in der kirchlichen Aufklärung* (1910); *Unwissenschaftlichkeit und Unglaube in der kirchlichen Aufklärung* (1910); *Der Rechtsanspruch der katholischen Kirche in Deutschland auf finanzielle Leistungen Seitens des Staates* (1913). He also contributed to periodicals and encyclopedias.

SAGO, a farinaceous food, obtained from the central portion of various species of tropical palms, principally, however, from *Metroxylon rumphii* and *M. laeve.* The sago palms flourish in wet soil, and are cultivated in the East Indies, and particularly in Sarawak. They are rarely over 30 feet high and have stout stems, with an outer rind about two inches thick, as hard as bamboo, but filled with spongy pith, containing a large proportion of starch.

The preparation of sago is one of the industries of the East Indies. The trees flower only once, and if allowed to do so, and to fruit, would exhaust the mass of starch stored in their stems, and then die, after propagating themselves either by seeds or by offshoots. To prevent this, the trees are felled when they are about 15 years old and on the point of flowering. The starchy tissue, then most productive, is extracted and pounded or grated to a powder. This is kneaded in water, in a cloth or sieve, the escaping water carrying the starch into a trough, where it is washed and settled out, until fit for use. The water is then drawn off and the caked residue is ready for native cookery. This cake, or meal, when made into a paste and pressed through a sieve, forms fine pearly grains, which are left either in their original brownish hue, or are bleached, and compose the commercial product, pearl sago.

Sago-meal is eaten by the natives as pottage, or as biscuits, partially baked in earthen molds. It is not entirely soluble in hot water, as is ordinary starch, and can, therefore, be employed in making puddings, etc., forming a valuable article of food, as it is cheap, nutritious and easy of digestion. In Europe it is used for feeding stock, making starch and by cocoa manufacturers for their beverages. Inferior qualities of sago are produced by *Phoenix farinifera, Corypha* of various species, *Caryota urens, Raphia flabelliformis,* and two South American palms.

Portland sago is a delicate farina extracted from the corm of the European wake-robin (*Arum maculatum*). Wild sago is the product of the coontie-root. (*Zamia integrifolia*), a cycadaceous plant of Florida, well known as an article of food among the Seminoles; and other cycads, incorrectly called sago palms, furnish a coarse kind of sago.

SAGOIN, sa-goin', or **SAGOUIN,** a French form of the native South American name of a genus (*Callithrix*) of Brazilian monkeys, of small size and remarkably light, active and graceful in their movements.

SAGOYEWATHA. See Red Jacket.

SAGUA LA GRANDE, sä'gwä lä grän'dā, Cuba, town in the Province of Santa Clara, on the Sagua la Grande River, 150 miles east of Havana. It is connected by railroad with La Isabela, its port on the north coast, with Cienfuegos, Havana and Matanzas, and with towns to the east; and carries on a considerable trade, sugar and molasses being the chief exports. Formerly gold was mined in the vicinity to some extent. It is well built, with wide and regular streets; among its public buildings are a hospital, a town hall and a large church; it has also several schools. Pop. (1931) 19,035.

SAGUENAY (săg-ĕ-nā) **RIVER,** Canada, large river in the Province of Quebec, emptying into the Saint Lawrence at Tadousac Harbor. It is about 120 miles long and of remarkable depth—17 to 500 fathoms. It drains Lake Saint John and flows with almost unparalleled impetuosity, between high rocky walls and over deep precipices, forming numerous falls and cataracts in its upper course. Its magnificent scenery attracts many tourists. It is navigable for large vessels as far as Ha Ha Bay, 10 miles south of Chicoutimi.

SAGUNTUM, sa-gun'tŭm, now **SAGUNTO,** or **MURVIEDRO,** Spain (*Hispania Tarraconensis*), situated near the mouth of the Palantias, three miles from the coast and 18 miles by rail from Valencia. It was a rich commercial town in early times, especially famous for its figs and manufacture of a certain kind of pottery. The town was founded (date unknown) by Greek colonists from Zacynthus, whence its name. In the interval between the First and Second Punic wars, it formed an alliance with the Romans, and became celebrated for the resistance it made to Hannibal in the siege of 219–218 B.C. The city was nearly destroyed at this time, but the Romans rebuilt it and made it a colony. The ancient city is now replaced by the modern Murviedro, and the only important ruins are those of the theater. Pop. (1930) 20,235.

SAHAPTIAN. See Shahaptian Indians.

SAHARA, sa-hä'ra, Africa, the great desert region in the north of the continent, extending from the Atlantic eastward as far as the Nile, and from the Mediterranean provinces to the Niger and Lake Tchad. Its area is about 1,500,000 square miles,—equal to four fifths of Europe. The configuration is irregular and the surface highly diversified, reaching from 100 feet below the sea level to an altitude of from 5,000 to 8,800 feet in Mount Tousside. Some of the highest summits are those of the Ahaggar, a great mountain plateau. Aïr or Asben is an isolated mountain, midway between Tibesti and the Niger. Farther south is the extensive plateau of Adghagh. At the northeast in Fezzan are the dark mountains of Jebel es Sóda. The rest of the Sahara consists generally of undulating rocky surfaces and sand dunes interspersed with occasional oases. The date palm flourishes on these green spots, also the olive tree. Apples, peaches, oranges, grapes, etc., grow, and wheat, barley, rice, durra and other tropical crops are raised, and there is a considerable variety of flora. Mammals consist, outside of the domestic animals, such as camels, asses, black cattle, of 15 species, compris-

ing the jerboa, fox, jackal, baboon, hyenas, mountain sheep, etc.; about 80 species of birds, among which is the ostrich. There are also tortoises, lizards, chameleons, serpents, such as the python, horned viper, etc. The edible frog and fish also occur. There is an important trade in silk tissues and mixed goods, ivory, ostrich feathers, gums, spices, musk, hides, gold dust, indigo, cotton, palm oil, kola nuts, silver, dates, salt and alum. The imports are textiles, weapons, gunpowder, etc. Many thousand tons of phosphate are extracted. The range of temperature is very great. The chief centers of population are the oases. The inhabitants consist of Moors, Tuareg, Tibbu, Negroes, Arabs and Jews; the former occupy the region between Fezzan and Lake Tchad. The tribes of the desert inhabit the south of Algeria and Tunis. The Tuareg control the principal caravan routes. The Tibbu, who number about 200,000, live in the oases between Fezzan and Lake Tchad. By convention with Great Britain, the right of France to all the Sahara except the Libyan Desert is recognized, or about three fifths of the whole, outside Tripoli and a small portion owned by Spain. The Sahara is included in the province of French Sudan. The French government and private individuals have experimented with traffic by specially designed motor cars, with success, and regular routes are maintained to Timbuktu and other cities. The French Sahara has an area of about 1,500,000 square miles, and a population of about 2,000,000.

SAHARANPUR, sa-här-an-poor′, or **SEHARUNPOOR,** sĕ-här-ŭn-poor, India, (1) capital of a district of the same name, in the United Provinces of Agra and Oudh, 90 miles northeast of Delhi. It is an important railway junction. Among the buildings the most noteworthy are an old Rohilla fort (used as a courthouse), and a fine Mohammedan mosque. The residential part is substantial and modern. There is a church, an American Presbyterian mission and a fine botanical garden for experiments in tea and cinchona. Commerce in grain, sugar, molasses, and country cloth is considerable. Pop. about 70,000.

(2) The district in the Meerut division has an area of about 2,242 square miles, and occupies an alluvial tableland between the Ganges and the Jumna. It consists partly of wildly picturesque broken ground, but the larger portion is tillable. Cereals are the chief products, and its commercial importance is considerable. Pop. about 1,200,000.

SAHIB, sä′ĭb, the term of native address in India to a reputable European. It is an Arabic word, signifying companion or lord. The feminine form is *Sahibâ.*

SAI, sä′ĭ, a Brazilian native name for a local monkey of indefinite application, most often, perhaps, designating the capuchin (*Cebus capucinus*).

SAID PASHA, sä-ēd păsh′â, Turkish statesman: b. 1835; d. Constantinople, Oct. 29, 1907. He commanded an army corps in the Russo-Turkish War, became governor of Cyprus and was later appointed secretary of state. He was premier 1879–1882, was grand vizier 1882–1885 and was twice dismissed but reinstated by the sultan in 1883. In 1885–1895 he was minister of foreign affairs, and subsequently president of the Council of Ministers.

SAIGA, sī′gą, an antelope (*Saiga tartarica*) found on the steppes of Russia and in western Asia. It is about two and one half feet high at the shoulders, pale bluish-gray in color and is remarkable for the greatly swollen appearance of the nose, due to the thick cartilaginous coverings of the nostrils.

SAIGO, Kichinosuke Takamori, Japanese patriot: b. Kagoshima, 1827; d. there, Sept. 24, 1877. He was of the samurai class and an enthusiastic partisan of the Mikado. In 1858 the vigor with which he urged the overthrow of the Tokugawa administration caused his banishment to Satsuma. He took an important part in the restoration of the Mikado in 1868. He was appointed commander-in-chief of the army by the Mikado and retained the office until 1873 when, his desire to attack Korea being overruled, he retired to Kagoshima. The samurai class, which was largely disaffected because of opposition to the progressiveness of the emperor, rallied to his support and in 1877 launched a rebellion against the government. He fell in action at Kagoshima. The government, mindful of his invaluable services in establishing the Mikado on the throne, erected a bronze statue of him at Tokyo.

SAIGON, sī-gōn′ (Fr. sâ-ē-gôn′), French Indochina, capital of the colony of Cochinchina, on the right bank of the Saigon or Donnai River, 34 miles from the sea. Before the French conquest, Saigon (then known as Gaidinh-thanh) was the capital of Lower Cochinchina. It was captured by the French in 1859 and was included in the territory ceded to France in 1862. The city adjoins the municipality of Cholon to the southwest, with which it is united by railway, tramways, roads and canal, and the two comprise a new administrative division, the Region Saigon-Cholon. Saigon had, in 1936, a population of 110,577, of whom 9,821 were French and 274 other Europeans. The population of Cholon in the same year was 145,-254, almost entirely Asiatic.

Saigon has fine public buildings, modern shaded streets, and zoological and botanical gardens; its educational institutions include the colleges of Chasseloup-Laubat and d'Adran. There are seven banks or bank-agencies in the city, the two chief ones being the Franco-Chinese Bank and the Indochina Bank. Saigon handles half the seaborne foreign trade of the country, chief exports being rice, rubber, maize, teakwood, tin, tea, pepper, and hides. An active trade is carried on with China, Siam, Singapore, and Java. Considerable French and English goods are imported, among them textiles, petroleum products, raw cotton, iron and steel, machinery, and paper. During 1938, the well-equipped port was visited by 777 ships totaling 2,494,000 tons. The chief industries of Saigon and Cholon are rice and sawmilling, electric power, alcoholic beverages, textiles, soap, and chemicals. Saigon is the seat of two Chambers of the Court of Appeal of French Indochina, of tribunals of first instance and of commerce, and of the vicar apostolic of Cochinchina. See also FRENCH INDOCHINA.

SAIL, or **SAIL-TAILED, LIZARD,** a large agamoid lizard (*Lophurus amboinensis*) of the Philippines, Celebes, Java and neighboring islands, which takes its name from the tall sail-like crest bone upon the upper surface of

the tail of the adult, which is supported by a great lengthening of the spines of the vertebræ of that region; the tail otherwise is highly compressed, long and powerful. The lizard frequently exceeds three feet in length, is olive-green, spotted and marbled with black, and has many curious folds of skin about the neck. It is strong and active and spends much of its time in trees, but when alarmed or chased rushes for water, dives to the bottom and endeavors to hide among the stones. It is defenseless and harmless, and its flesh, which is white and tender, is much liked by the islanders.

SAIL. See SHIP.

SAILCLOTH, a coarse, strong linen, cotton or hempen cloth used in making sails. The best is made of flax, and combines flexibility with lightness and strength. See SHIP.

SAILFISH, a large predaceous fish (*Istiophorus nigricans*) of the West Indian and neighboring waters, which is closely allied to the sword-fishes and of the same family as the spear-fishes (*Tetrapturus*). It reaches a length of six feet, has an elongated, much compressed body, covered with elongate scutes, and a powerful, deeply forked tail, while the dorsal fin is, relatively, of huge size and deeply notched outline, well simulating the appearance of a ship under sail as it appears above the water when the fish glides along the surface as it frequently does. The bones of the nose are prolonged into a "sword," not so long as that of the sword-fish, but sharper, and they are an effective weapon in a school of small fish.

SAILING. See NAVIGATION; SHIP; SAILING VESSELS.

SAILING VESSELS. The first vessel of which history gives any description is the *Ark,* as built by Noah. Its proportions possess some interest, because, though not intended for a voyage, it may be inferred that it was constructed to float with as little motion as possible, considering that it "went upon the face of the waters" for about five months. Assuming a cubit to be about 21 inches, its length was 525 feet, its breadth 87 feet 6 inches and its depth 52 feet 6 inches. Its length is thus seen to have been six times its breadth, which proportion is about an average of all types of vessels. Its draft of water must have varied greatly during the period of its occupation, as 12 months' provisions must have formed a very large proportion of the original weight, and these must have been gradually consumed. It had three decks; but was fitted with neither masts, sails nor rudder.

Ancient History.— The paintings and sculptures, as the early records of Egypt, show regularly formed boats constructed of sawed planks of timber, propelled by numerous rowers, and also by sails. These vessels were long galleys with one mast and a large square sail, which was sometimes of linen and sometimes of papyrus. The oldest authentic record as to these sailing vessels is the illustration of one of them used as a decoration on an Egyptian amphora (in the British Museum), judged by the best authorities to have been made about 6000 B.C. It is to be noted, however, that these boats could sail only with the wind, and that the science of tacking and sailing against the wind was unknown for, literally, thousands of years, during which vessels sailed if the wind was favorable, and unshipped the mast, and set the oarsmen at work when it was contrary. The Hebrews in the time of Solomon must have possessed vessels of considerable size, as mention is made in the sacred writings of that date of stately ships, and of voyages made to bring trees of considerable size to be used in the building of the temple. The Phœnicians about 1200 B.C. had sailing vessels which did not differ in any important respect from those of the Egyptians, but they seem to have developed the art of sailing to a considerable degree. Later they were connected with the Hebrews in their maritime expeditions, and this people appear to have been the most enterprising in navigation of all the nations of antiquity. Herodotus tells us of their feat of circumnavigating the continent of Africa in 604 B.C. They started from the Red Sea, passing Ophir on east coast of Africa, then rounded the Cape, and keeping by the west shore they entered the Mediterranean Sea through the Straits of Gibraltar, and arrived in Egypt in the third year of their expedition. Little doubt exists of the Phœnicians having been the discoverers of the art of sailing, as their skill in evading Nebuchadnezzar at the siege of Tyre for 13 years shows that they possessed more than a superficial knowledge of navigation. They were also engaged in concert with other nations in wars with the Greeks: and it was from them the latter nation learned in their conflicts what they knew of ships and navigation. The fact of the Grecian mariners making use of the screw pump to discharge water from their vessels' holds would lead to the conclusion that their vessels were no mere sloops; yet the relative placidity of the waters in which they sailed suggests that their vessels were sailing boats rather than sailing ships. An evidence of the want of strength in the construction of these ancient vessels is the fact of their being bound around the outside with heavy ropes. They were sometimes carried as part of the vessel's outfit, and used as necessity required. Out at sea and in heavy weather, they were made use of. There were sometimes as many as 8 or 10 bands running fore and aft of the vessel. The Greek warships were strengthened to withstand the shock of ramming by the addition of longitudinal timbers secured to the exterior of the hull. At this period it was the custom of mariners to draw their fragile vessels out upon the shores at the approach of autumnal storms, and to leave them there till mild weather came again in the spring.

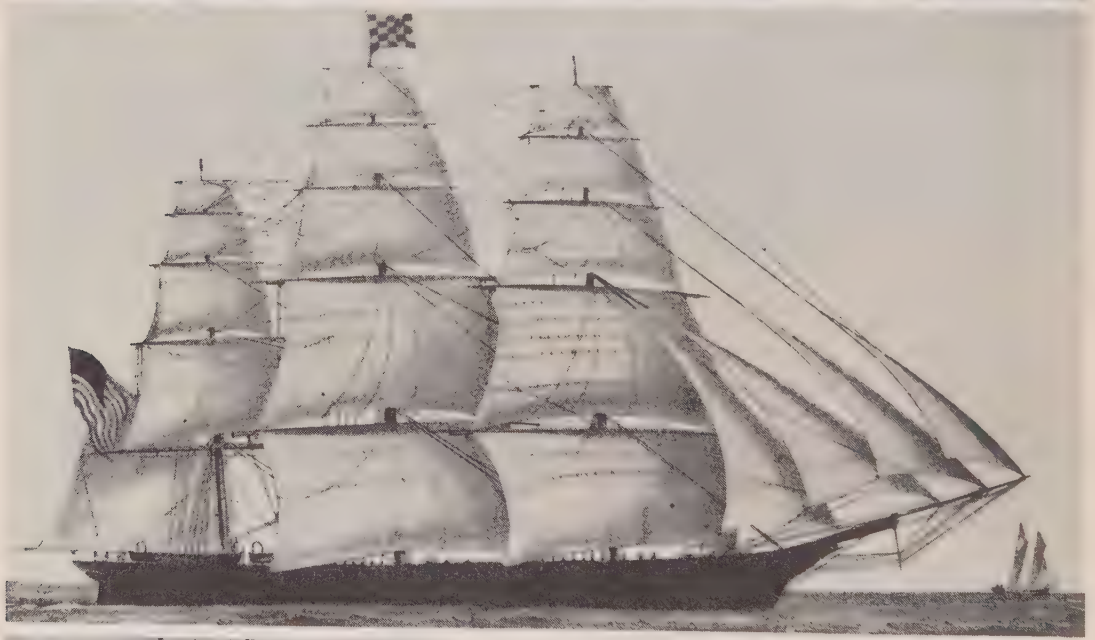
Roman Galleys.— The Romans in the early stage of their history paid little attention to navigation, until it was forced upon them by the necessity of competing with their rivals, the Carthaginians. The galleys of this period ranged from a single bank up to five banks of oars. The oars in these large galleys were arranged in sets or banks; the number of these could be increased to any extent by giving increased length to the galley. The trireme, or three-bank galley, appears to have been generally open, in the waist where the rowers sat, with decks or platforms at both ends for the soldiers. The galleys of greater size than the three tiers appear to have been always decked

SAILING VESSELS

"Blue Peter" Publishing Co., Ltd., London

Above: American-built clipper ship, *Sovereign of the Seas,* 1852.

Below: A mid-19th century leviathan clipper ship, the *Great Republic,* had a deck 325 feet long.



SAILING VESSELS

Top: Ocean Rover, built in 1858 at Portsmouth, New Hampshire.

Center: New York clipper ship *Challenge,* built at New York in 1851.

Left: The last whaleship, now anchored in Mystic, Connecticut, where it serves as a museum of the whaling trade.

(Top and center) The Bettmann Archive; (left) Philip Gendreau, N.Y.

vessels. At the time of the First Punic War the Roman fleet is said to have consisted of 330 vessels, each containing 300 rowers and 120 soldiers. The triremes were each 105 feet long and 11 feet wide, and the quadriremes were 125 feet by 13 feet.

Viking Ships.— Of much sturdier build were the ships of the Norsemen, designed to sail the turbulent waters of the northern seas. The custom of burying noted Vikings in the boats which they commanded has preserved under great burial mounds a number of specimens of these early ships. One of these, found in England, was 48 feet long, 9 feet 9 inches beam and 4 feet depth of hold. Another, unearthed in Norway, was 45 feet 6 inches in length, about 14 feet beam and 4 feet deep. The famous Gogstad ship, exhumed in 1880, was 79 feet 4 inches long, 16 feet 6 inches beam, 6 feet deep amidships and 8 feet 6 inches deep at bow and stern. All of these vessels were of oak, clinker-built and caulked with moss or hair of some animal. They have been decided by antiquaries to belong to the 3d century. The remains of a much larger vessel, prodigious for its time, were found in the Orkneys. It was 130 feet in length and had a depth of hold of about 15 feet. This vessel is regarded as belonging to the latter part of the 9th century, and is believed to have been one of the ships with which the Vikings conducted raids on the coast of England. These raids served to stir Alfred the Great (848–890) with a spirit of rivalry and he proceeded to build ships twice as large as those of the enemy, but of the same type. It is noteworthy, however, that he failed to find seamen of experience in his own kingdom, but was compelled to hire them in Holland. Under Athelston, the grandson of Alfred (895–941), it is known that a considerable merchant trade was carried on with France and Flanders by English sailing ships; and it is recorded in history that King Edgar (944–975) had a fleet of some 4,000 sailing ships stationed as a guard around the entire coast of Great Britain.

The expedition of Richard Cœur de Lion (1157–99) to the Holy Land led to the remodeling in some respects of the English sailing craft, through the adoption of some of the developments in construction of the ships of the Mediterranean, which were much larger as to hull, and carried taller masts and a larger area of sail. But these improvements in the English ships were chiefly those for warlike purposes and the more important features of the Mediterranean vessels seem to have been overlooked, or at least neglected, for they did not appear in the English ships until the 15th century.

Merchant Ships.— It is generally supposed that ships intended only for merchant purposes were first built by the Genoese, and that not until the beginning of the 14th century were sails first used by that people. The fishing boats were the small beginning from which sprang the sailers and the larger sail vessels of a later period. But it is an indisputable fact that long before this time ships of three decks and of 600 or 700 tons, of Italian build, were sailing the Mediterranean with both freight and passengers. In England, as early as 1344, many vessels of this character were in service. In the middle of the 15th century many large vessels were built in England, but they were mostly naval vessels. Prior to this the compass had come into more general use, and it was now possible to engage in longer voyages. The discovery of America and the passage around the Cape of Good Hope were early fruits of these improvements. The Portuguese employed vessels of small size in their voyages of discovery, but the Spaniards built larger vessels and long maintained a superiority in this respect. England was far behind the Peninsular nations in commercial enterprise at the opening of the 16th century, but under the reign of Queen Elizabeth (1558–1603) the merchant marine of England was relieved of many oppressive laws and the coasting trade of the British Isles was reserved exclusively for British ships. And not only did the coasting trade flourish, but English shipping began to contest successfully with that of Italy, Spain and Portugal for the carrying trade of the world. Moreover, a distinct change appeared in the design of English ships in the abandonment of the high Spanish poop and forecastle prevalent on the vessels which sailed the Mediterranean. Meanwhile the French had not been idle, and while their merchant ships were few and small, they were building war vessels which compared well with those of Spain and England, though leaning in type toward the Spanish models. The *Cordeliere* of 700 tons and the *Grand Louise* of 790 tons were as large as any ships afloat.

The Spanish Armada, which visited English waters in 1588, comprised 130 sailing vessels of all sorts, with a total tonnage of 60,000. Some 60 of these were galleons of the largest type. The wrecking of one of them on the western coast showed it to be of 900 tons. At this time the «treasure-ships» of Spain, 100 feet in length and 34 feet in breadth, were making regular voyages across the Atlantic for the gold and silver of the New World. More light on the shipping of those days is afforded by the record of the carak *Madre de Dios,* captured by the English in 1592. This vessel was 165 feet in length, 46 feet 10 inches beam and drew 26 feet of water. The height of her mainmast was 121 feet and her main yard was 106 feet long. Her capacity was 1,600 tons, by far the largest known up to that time.

The Dutch ships of this period were distinctive in model owing to the shallow waters in which they sailed. They were low and of comparatively wide beam and large sail area. For their smaller craft the Dutch had already developed the fore and aft rig, and were using both the sprit sail and sprit topsail on their galleons. It is to be noted in passing that the Dutch galleons were at this time determinedly engaged in the first polar explorations on record — the endeavor to find a northeast passage to China (1594, 1595 and 1596). From the earliest times the Dutch had been fishermen and accomplished navigators, and while their war fleet was small, their merchant fleet grew apace and by the early part of the 17th century they controlled the coasting trade as far south as Portugal and were successfully monopolizing the East India trade of Britain. The English merchant marine was in a very depressed condition. Internal discords had put a damper on the enterprise of the merchants, and as the island was not yet famed for its manufactures,

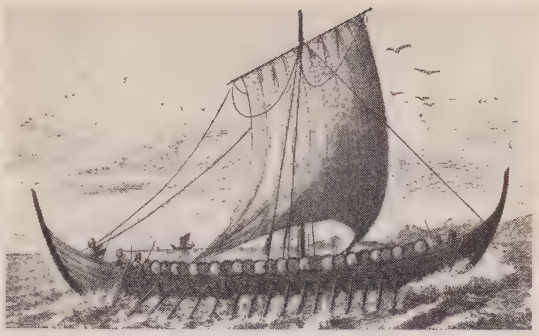
commerce dropped with every disaster to trade. The British East Indies Company was formed under the auspices of Queen Elizabeth (1599) and some great ships were built for this trade, the largest being the *Trade's Increase* of 1,200 tons. From this time onward the British made every effort to control the shipping trade of the world. The Dutch were their principal competitors, and had, without doubt, the best-built and best-manned fleet and had established colonies in South America, to which their ships made regular voyages. The British policy was to build larger ships than those of any other nation and in this they surpassed the Dutch, but the French excelled them. The *Sovereign of the Seas,* built in 1637, was the largest of the British ships at this period. She was 170 feet long, 48 feet beam and 19 feet deep and measured 1,683 tons. The largest Dutch ships at that time were the *White Elephant* of 1,482 tons and the *Golden Lion* of 1,477 tons. The French had the *Soleil Royal* of 1,946 tons and the *Royal Louis* of 1,800 tons. The English continued to build larger vessels and in the early 18th century had the *Royal George* of 2,047 tons, and in 1765 launched the *Victory,* Nelson's famous flagship of 2,162 tons. The capture by the British in 1792 of the French *Commerce de Marseilles* of 2,747 tons aroused new emulation of the French shipbuilders, and the direct result of this impetus was the *Caledonia,* launched in 1808, a vessel 205 feet in length and of 2,616 tons.

The First American Ships.— This continent having been fitted by nature in supplying it with an abundance of good timber, vessels have been built upon our shores from the first year of actual settlement. The first ship constructed was for the purpose of carrying a small band of settlers back to England, who were discouraged with their prospects after the first winter. The vessel was built in 1607 at Stage Island, near the mouth of the Kennebec River in Maine. It was a staunch and excellent little vessel of 30 tons, a two-master, named *Virginia.* She is believed to have been about 30 feet long, 13 feet beam and 8 feet deep. She subsequently made a number of voyages between America and England. The next vessel built was at New York in 1614 by Capt. Adrien Blok, who had lost his ship *Tiger* by fire while lying in Manhattan River. His new vessel was named *Onrust* (*Restless*) and was 38 feet keel, 44½ feet long over all and 11 feet beam. This vessel was employed for several years in exploring the Atlantic Coast from the 38th to the 42d degree of latitude. Block Island was visited during one of the excursions and took its name from Adrien Blok. With the exception of fishing boats and shallops, there is no record of the construction of any other boats until 1631. In that year the 30-ton bark *Blessing of the Bay* was launched at Medford, Mass., for the use of the Massachusetts colony. In the course of the season this vessel made several coasting trips and soon after visited Manhattan Island and Long Island. It is thought the vessel was lost with a load of furs and fish in 1633 off the capes of Virginia. By 1635 there were six of these small sailing vessels regularly employed in the trade with England. In 1636 the *Desire* of 120 tons was built at Marblehead and put into the fishing business.

Early Shipbuilding.— Shipbuilding at this time appears to have received its impulse from the same cause which threw the colonists upon their own resources for the supply of many of the necessaries of life. They had been hitherto supplied with all but their corn and fish by the many emigrant ships which had yearly added to their numbers. A suspension of this emigration, brought about by the civil wars in England, and the diminished intercourse caused thereby, left them dependent on mercantile enterprise alone, which the state of navigation then rendered precarious in the extreme. Governor Winthrop then said, "The general fear, of the want of foreign commodities, now our money was gone, and things were like to go well in England, set us on work to provide shipping of our own: for which end Mr. (Hugh) Peter, being a man of very public spirit and singular activity for all occasions, procured some to join for building a ship at Salem of 300 tons, and the inhabitants of Boston, stirred by his example, set upon the building of another at Boston of 150 tons. The work was hard to accomplish for want of money, etc., but our shipwrights were content to take such pay as the country could make." He speaks in another place of the *Trial* of 160 tons, as the first ship built at Boston. She sailed for Bilboa on 4 June 1642, laden with fish, "which she sold there at good rate, and from thence freighted to Malaga." Thus early began the profitable trade to distant ports from New England, and by 1676 the colony of Massachusetts owned 200 vessels of from 30 tons to 50 tons; 200 of from 50 tons to 100 tons, and 30 above 100 tons. An early and successful prosecution of the business of shipbuilding could have been more reasonably expected of none of the first colonists of America than of the settlers of Manhattan. Holland was at that period, and long after, in the enjoyment of the carrying trade of the world. Though not possessed of a foot of timber, she built and armed more ships than all the rest of Europe. Planted by this commercial people, and by merchants and capitalists of Amsterdam, then the mercantile metropolis of Europe, exclusively for the purposes of trade, it appears somewhat surprising that the facilities afforded by the new territory for shipbuilding were not made available to a greater extent by the parent nation. But the administration of a privileged mercantile association, such as the West India Company, which, in 1621, was invested with a monopoly of its trade, was unfavorable to the development of the resources of the colony. About 1630 the carrying trade between Holland and America, and the trade with Brazil, where the company had sustained losses equivalent to "one hundred tons of gold," were thrown open to the colonists and private ships were for the first time entered at Amsterdam and publicly advertised for New Netherlands. Other restrictions, which had fettered commerce, were soon after removed and the trade of the world with the exception of that to the East Indies, and the trade in furs, were open to the colonists. In 1678 the shipping owned in the port consisted of three ships and 15 sloops and other small sailing vessels. In 1694 the shipping had increased to 60 ships and 102 sloops. This was on account of a monopoly of exporting flour and biscuits from the

SAILING VESSELS

Historical types: (1) Phoenician ship.



(2) Norse ship.

(3) Ancient ships off Cyprus.

(4) Shipping in the late 13th century.

(5) A 15th century ship.

(6) Late 15th century Portuguese ship.

(7) Hanseatic League ship.

(8) A 15th century Spanish galleon.

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SAILING VESSELS

Historical types (cont'd): (1) Two 17th century battleships. (2) 17th century corvette.

(3) Brigantine and (4) small cutter-rigged vessel of the 17th century. Together with the corvette type, they plied West Indian routes, both as traders and as privateers.

(5) The famous *Constitution* or *Old Ironsides*.

(6) United States frigate of 1812.

(7) Five types of gunboats at beginning of 19th century.

(8) *Savannah*, a Confederate privateer.

Historical Pictures Service

province. South of New York during colonial times there was little or no construction of vessels. New England developed her large shipping interests through the fisheries that were at her door and the coasting trade maintained by the latter extended as far south as the West Indies during these early days. It might be said the fisheries were the cause of the large merchant marine of New England. Between the years 1674 and 1714 a total of 1,332 vessels were registered as built in New England yards, in many cases by men drawn from English shipyards. Of those built, 239 were sold to foreign owners.

The Schooner.— In 1745 Andrew Robinson of Gloucester, Mass., built a vessel with a square stern, which was fitted with two masts, bearing a sloop sail on each, and a bowsprit with jib. She was sharp on the bottom and on being launched sped over the water so fast from the impetus gained by descending from the ways as to elicit from a bystander the remark, "See how she scoons." Scoon was a word used by plain people to express the skipping of a flat stone over the surface of the water when skilfully thrown; and the builder of the vessel, having been somewhat at a loss for a name for the new rig, seized upon the trifling incident and replied, "A scooner let her be," and two-masted vessels, with jibs, and fore and aft sails have since been called by that name. This vessel was probably used in the fisheries. The schooner proved to be a very economical vessel to run, with fewer men to her sail area than any other type of sailing vessel. The largest schooners were those sent to the Grand Banks, and for many years after 1800 about 70 sailing vessels were sent annually to the Grand Banks, chiefly from Cape Ann. These early vessels were from 20 to 40 tons.

Colonial Merchant Marine.— Before the Revolutionary War our merchant marine was in a prosperous condition and took nearly first rank with us. By 1760 from 300 to 400 trading vessels were being built annually in the different provinces. In 1769 alone, 389 ships with a tonnage exceeding in the aggregate 20,000 tons were turned out of American shipyards. Of these, 113 were square-rigged and a large proportion of the remainder were schooners. Few of these exceeded 200 tons. During the War of the Revolution the whaling and fishing fleets suffered seriously from raids by English cruisers. Foreign trade in our vessels suffered the same fate. A large part of the merchant and fishing fleet was employed during the war in privateering and it became a profitable field for them at times, as small armed sloops frequently captured large merchantmen under the British flag. The larger privateers built during the war, when the conflict was over, were converted into merchantmen and sent to the East Indies to trade. The Baltimore-built schooner took high rank as a privateer during the war. The 16 years that followed ending with the War of 1812 were perilous times for American shipping. England excluded us from a profitable trade with the British West Indies and the same interests led to the searching of our merchant vessels for British subjects, the capture and confiscation of our vessels and cargoes and a detention of a large number of them for evasions of the British law. The American merchant fleet which had increased to a total registry of 848,307 tons in 1807 fell to 769,054 tons in 1808, under the restrictions of the American embargo laid at the insistence of Great Britain. The repeal of the embargo in 1809 brought the tonnage of the merchant fleet to 910,059 and in 1810 it reached its high-water mark for many decades to come at 984,269 tons. Then came on the War of 1812 that lasted for nearly three years, during which many privateers were constructed that subsequently pursued the peaceful pursuit of trade. A change in the form of our sailing vessels now began to appear, giving them better entrance lines, and cutting off those high poop decks that had been such a fixture on large vessels for many years.

The Carrying Trade.— Prior to the War of 1812 our coastwise trade was carried on by no larger sailing vessels than those that were schooner rigged, while our foreign trade was most largely carried on in foreign-built bottoms. Before 1812 a few sailing packets, or vessels carrying both passengers and freight, were brought into the transportation business, and cleared from port on regular days in each month, and were operated between special points only. At this time, however, there were many American-built whalers making three-year voyages to the Pacific from Massachusetts harbors and not a few had gone as far as Bering's Sea. The average tonnage of these daring vessels was less than 300 tons. When the war ended there were only a few small British ships in the packet service between England and America, and very few between America and other parts of the world. Soon after the peace, however, a large number of lines came into existence as a natural outgrowth of the rush of emigration from Europe to America, and the general expansion of ocean travel and trade. The carrying of passengers was a profitable business and there was considerable competition among shipping merchants to get the most business for their vessels. None but the best and finest vessels could be used in this trade and the old-fashioned freighting vessels with their small cabins and houses and poop decks, were subjected to many changes to adapt them to the passenger business. The merchants at most all our coastwise ports, from Portland, Me., to New Orleans, La., soon saw the advantage of these packets for our coastwise trade and regular established lines were soon in operation that remained as carriers until the coastwise steamship lines began operations in 1847, when these lines of sailing vessels gradually withdrew from business. In this trade brigs, schooners and barks were used, while in the foreign service ships and barks only were placed in service.

Packet Lines.— It was at New York the packet business between Europe and America mainly centred. There were lines from other ports, but New York was the pioneer, always kept the lead and had the largest number and finest vessels for the service. In 1816 Isaac Wright and Company of New York founded the famous Black Ball Line, so called from the round black circle in a white field, which was adopted as the pennant of the ships. There were at first four vessels in this line, each of 400 tons, and named *Pacific*, *Courier*, *Amity* and *James Monroe*. This line was subsequently owned by Goodhue and Company, Charles H.

Marshall and others, and a dozen other ships added, from 300 to 500 tons burden. They were placed in the Liverpool trade and sailed once a month at first and during the first nine years the average time in voyages to Liverpool was 23 days and for returning home 40 days, but one of the later ships, the *Canada*, the fastest of them all, once made the outward voyage in 15 days and 18 hours and held for a long time the average record of 19 days outward and 36 days homeward trips. A London line followed the Black Ball line and then a Havre line was started. In 1821 a second Liverpool line was established from New York by Byrnes, Trimble and Company, known as the Red Star line, consisting of the *Manhattan, Hercules, Panther* and *Meteor*, sailing once a month, and soon after Fish, Grinnell and Company, afterward Grinnell, Minturn and Company, founded the Swallow Tail line with four packets, making from New York at this time, one sailing for Liverpool each week. In 1830 the passenger fare in the cabin from Liverpool was $180, including beds, bedding, wines and stores of every description. The London packets now sailed twice a month and the Havre line had three sailings a month. There were also at this time sailing packets to South America and Mexican ports. In 1830 there were 1,510 arrivals at New York from foreign ports, of which 382 were ships, 28 barks, 714 brigs, 376 schooners, 8 sloops, 1 ketch and 1 felucca. Of these, 1,366 were American, 92 British, 7 Spanish, 12 Swedish, 2 Hamburg, 5 French, 8 Bremen, 6 Haitian, 9 Danish, 2 Brazilian, 2 Dutch and 1 Portuguese. The number of arrivals in 1829 was 1,310, and passengers, 16,064. In 1823 John Griswold established a London line of four vessels, that had been increased by 1837 to 12 vessels. These vessels down to 1845 were one- or two-decked vessels, and had increased in size from 900 to 1,000 tons. The between deck space, aft, was divided into cabins for the passengers, the middle portion was fitted up with kitchens, pantries, etc. The steerage passengers and crew were placed forward. After 1830 there were frequent sailings of rival packets, transient, but all American, from Boston, New York, and Philadelphia to Great Britain and other parts of Europe. All the ships sailed with great speed and made the run across the Atlantic in excellent time. The *Red Jacket* once ran from New York to Liverpool in 13 days 11½ hours. The *Mary Whiteridge* made the voyage from Baltimore in 13 days 7 hours; but the usual time was 19, 20 or 21 days to Liverpool and from 30 to 35 days homeward. English steamers were sent out in 1838 and 1840 to compete with these packet lines; but the steamers did not at first make much better average time on a voyage than the packets, but in the course of a few years the increase in speed and their additional carrying capacity gave them an advantage and the packets could no longer successfully compete with them.

Clipper Ships.—After the packets came the clipper ships, vessels intended primarily for freighting, and built to secure the highest possible speed when laden with cargo. The packets were the fast sailers from 1816 to 1845, but after the latter date there grew up various branches of trade in which a quick delivery was as important for commercial purposes as it was for the passenger trade. For instance, there was the tea trade from China to the United States, in which speed has always been considered essential. The cargoes consisted of teas, spices, coffee, dried fruits, etc., which were liable to deteriorate in a long voyage of four months to the home port, and to shorten the voyage as much as possible was desirable for many reasons. There were no telegraph lines and ocean cables in those days and the uncertainty of the markets made fast trips home from the East Indies very important. Merchants had repeatedly suffered heavy loss, sometimes business ruin by the decline in eastern goods brought home by ships during their absence on the voyage out and back, and good ships were, therefore, always required in that trade. The first clipper, the *Scottish Maid*, was built in 1839 in Great Britain. She was a schooner of 150 tons and proved very fast and continued in service for 50 years. The first American clippers were built at Boston and Medford. These were small schooners, the *Angola* of 90 tons and the *Zephyr* of 150 tons. They were used in the opium trade. The pioneer of the large clippers was the *Helena*, of 650 tons, whose dimensions were 135 feet length on deck, 30 feet 6 inch beam and 20 feet depth of hold, built by William H. Webb. She came out in 1841 and was constructed for A. and N. Griswold for the China trade. She was a good sea boat and a very fast sailer for her day, making many fast voyages between China and other East Indian countries and New York. Following the *Helena* came the *Rainbow* of 750 tons, built by Smith and Dimon in 1843 for Howland and Aspinwall. She was the first of the extremely sharp type and at the time was claimed by her captain to be the fastest ship in the world. Very few sailing ships since have equaled her records. This vessel made the voyage to Canton and return home in six months and 14 days, having spent three weeks of the time in loading and discharging cargo. The *Helena* and the *Rainbow* brought about a great change in this type of vessel. They commanded better prices for freights than sloop ships, and in every way proved desirable. Then in 1844 followed the *Montauk* of 540 tons for William S. Wetmore, built by William H. Webb. Then A. A. Low and Company had Brown and Bell construct for them the *Howqua* of 706 tons, a very fast and fine vessel, which made a voyage from Shanghai to New York in 84 days. The owners of the *Rainbow* then had the noted clipper *Sea Witch* of 907 tons, built by Smith and Dimon, with the intention to have the fastest vessel of the type afloat. This vessel had finer under water lines than her predecessors, and may be said to have been the first of that advanced type of fast clipper ships. She made one voyage to California in 97 days; to Hongkong in 104 days; to Valparaiso in 69 days; and returned from Canton to New York in 85 days. Her best 24 hours run was 358 miles, a speed greatly exceeding any steam vessel then existing. The era of fast clipper ships was now fairly inaugurated, and many of this class were now built not only at New York, but at Boston, Philadelphia and Baltimore. Nearly all the early ones did not exceed 1,000 tons register, or about 165 feet long, but competition led to

a great increase in size, and every year saw vessels launched that spread more and more canvas, longer, larger and faster than ever, and expressly intended to excel everthing that had preceded them in the merchant shipping of the world. In 10 years after the first clipper ship the size of 2,400 tons was reached and there were many built 2,000 tons each.

British Rivalry.—Foreign merchants were by no means idle spectators of what was going on in this country, and in 1846 England began to awake to the new and dangerous rivalry from America. The arrival of the *Oriental*, 1,003 tons, in London in 1850, 97 days from Hongkong, with 1,600 tons of tea, on which she collected $48,000 freight, created a furore. Not a single British ship was her equal in speed or elegance of line and construction. The British Admiralty sought and were given permission to draught her underwater lines in drydock; and a great impetus in the building of fast ships resulted. Alex. Hall and Company of Aberdeen made a specialty of clipper ships, and there were launched from their yard many superior and famous vessels. But the Americans, though hard pressed, were able to maintain the lead, and entitled to the best record ever made by ships sailing under canvas. There were several famous races home from China. Once the British clippers *Chrysolite* and *Stornaway* and the American clippers *Race Horse, Surprise* and *Challenge* engaged in a race from Canton to Liverpool and Deal and arrived at the home ports as follows: At Liverpool, *Chrysolite* in 106 days; at Deal, *Stornaway* in 109 days; *Challenge* in 105 days; *Surprise* in 106 days. The British ship *Challenge* ran from Shanghai to Deal in 113 days, and the American clipper *Nightingale* in 110 days. These races were claimed by both parties; but the Americans kept the reputation of superiority, and several ships were ordered at our shipyards for foreign account. Then shortly after the gold fever broke out in California, and the *John Bertram* of 1,100 tons was built at Boston, Mass., and sent to the Pacific Coast in 1850 by Boston parties. This was the first clipper ship built for the California trade. The *Witch of the Wave* and four others of 1,500 tons each were immediately after built for the same parties. The *Witch of the Wave* made the trip from Canton to Deal in 90 days — 15 days faster than the best previous record, that of the *Challenge*.

Sailing Speed.— The speed of the clippers was remarkable. Six miles an hour was a good average rate of speed for long voyages and nine miles an hour excellent time, especially for a ship loaded with a full cargo of merchandise. Clippers ran across the Atlantic to Liverpool at an average speed of nine miles an hour, spurting at the rate of from 10 to 13 miles with a favorable wind, and on voyages that gave them the advantage of the trade winds they ran for days and weeks in succession at an average speed of from 12 to 15 miles an hour. To sail 300 miles a day was not exceptional. The largest of them all was the four-master *Great Republic*, of 4,555 tons, built by Donald McKay in 1853 at East Boston. The length on load line was 314 feet, beam molded 49¼ feet, molded depth 32 feet. She was burned at her dock before sailing. The hull was afterward rebuilt at Greenpoint, L. I., and was launched at 3,357 tons, being still the largest ship afloat. One of the noted clippers of the day was the *Dreadnought* built in 1853 at Newburyport, Mass. In 1859 she made the voyage from Sandy Hook to Liverpool in 13 days, 8 hours. Fast as the *Dreadnought* was she failed to surpass the records of the *Red Jacket*, a Maine-built clipper of 2,006 tons, of 13 days, 1 hour from Sandy Hook to the Rock Light, Liverpool (1854), and of the *Andrew Jackson*, built at Mystic, Conn., of 1,679 tons, holding the record for the west-bound voyage, 15 days from Rock Light to Sandy Hook (1860).

Other record passages of those days which have never since been beaten are the following:

James Baines, 2,515 tons, launched at East Boston in 1854; 12 days, 6 hours, Boston to Liverpool. From Liverpool to Melbourne in the then record time of 63 days; and thence home to Boston in 69 days; making the circuit of the globe in the unequaled time of 132 days.

Lightning, American-built ship of 2,090 tons, Melbourne to Liverpool, 63 days (1853); Portsmouth to Calcutta, 87 days (1857).

North Wind, American built, 1,041 tons, London to Sidney, New South Wales, 67 days.

Mandarin, 776 tons, New York to Melbourne, 71 days.

Mary Whitridge, American built, 987 tons, Liverpool to Baltimore, 14 days, 9 hours (1855).

Marco Polo, American built, 1,512 tons, Liverpool to Melbourne, 61 days (1861).

Thermopylae, British built, 927 tons, London to Melbourne, 60 days (1869).

The record voyages of American sailing ships in the coastwise trade, known as the «California clippers,» were:

Flying Cloud, 1,793 tons, New York to San Francisco, 89 days (1851). The same feat was accomplished in 1854 by the same vessel and repeated in 1860 by the *Andrew Jackson*.

Northern Light, 1,021 tons, San Francisco to Boston Light, 76 days, 5 hours (1853).

Comet, 1,836 tons, San Francisco to New York, 76 days (1854).

The best day's run ever made by a sailing ship was 436 nautical miles, recorded by the *Lightning* on her maiden voyage from Boston to Liverpool in 1854. The highest speed ever recorded by a sailing ship was 21 nautical miles per hour, made by the *James Baines* on 17 June 1856.

After 1860 there was no longer any necessity for great size and speed in this type of vessel. Too many ships had been built and a reaction set in that lasted for many years. By 1857 there were from 80 to 100 large ships in the California trade and the rates of freight fell off one-half, and the ships were thrown into the general trade of the world. In the next place, steam vessels, about 1852, had been built to run on all the principal ocean routes and there was no longer any need for sailing vessels to be fitted out with large cabins and roomy passenger accommodations. This ended the career of those fast clipper ships that had such a world-wide reputation from 1850 to 1860. Then the Civil War came on and our foreign trade was cut off for four years. After 1865 the grain trade attracted the larger sailing vessels from all over the world. This type of vessel was no longer an extreme clipper of the former

period, but a handsome, medium clipper of from 1,400 tons for the British ships to 1,600 and up to 2,000 tons register, for the American; capable of carrying a large cargo at a fair rate of speed. The Maine shipyards at this time turned out a large number of strong wooden sailing ships of from 1,600 to 2,400 tons. These vessels continued in the Atlantic-Pacific trade until the American Hawaiian Steamship Line commenced operations in 1900.

Modern Schooners.— The schooner, as previously mentioned, was a distinctively American product of a comparatively early date (1713). It was largely used in the coastwise trade, to the West Indies, to South America and later to Africa, and it may be said has not fallen from favor even to this day. The early vessels were not over on an average 75 tons. When it became necessary to increase the tonnage of the vessel it was thought to be advantageous to increase the power, so three masts were adopted. The earliest date of the building of a three-masted schooner in this country is thought to be about 1831. There were a few more built about 1845, and in 1847 the *Midas* was converted into a three-masted schooner, the *Zachary Taylor* was built at Philadelphia in 1849 and the *Spray* at Wilmington, Del., the same year. The period when this type of sailing vessel had passed the experimental stage appears to have been in 1853 when there were built the *Gardner Pike*, the *James H. Chadbourne*, the *Kate Brigham* and the *E. R. Bennett;* and in 1855 the *Eckford Webb* and the *William L. Burroughs;* and in 1856 the *Hartstein* and the *Cordelia*. The two latter were two-decked vessels and were the largest of the type built for some years. These vessels were used mainly in our coasting trade, as far south as the Gulf of Mexico ports. There were a few more built prior to 1860; the Civil War came on when but few, if any, were built. It was 1868 before three-masted schooners were again constructed, and by 1873 they were the most popular type of our coastwise sailing vessels. The first *four*-masted schooner was the *William L. White*, built at Bath, Me., and completed in June 1880. The Northern lakes also had four-masters immediately after the *William L. White*. Then it was some years before the pioneer *five*-master was constructed in 1888 at Waldoboro, Me., as the *Governor Ames*. The latter was the largest schooner for 12 years, until the *George W. Wells* was built in 1900 as a *six*-masted schooner. The largest of them all was the *Thomas W. Lawson*, built of steel in 1902, as a *seven*-masted schooner. This superb vessel foundered off the Scilly Islands in 1907.

Iron Hull Ships.—Although iron had been used in Great Britain for building hulls as far back as 1829 and came into common use in the early 40's, the first iron hull sailing vessel constructed in the United States was the schooner *Mahlon Betts* of 275 tons, built in 1854 at Wilmington, Del. Then there were none but wooden sailing vessels until the brig *Novelty* was built at Boston, Mass., in 1868, and the bark *Iron Age* constructed in 1869 for Tupper and Beattie of New York. The sloop yacht *Vindex* was then built in 1871 at Chester, Pa., by Reanie Son and Archibold; and in 1879 the yacht *Mischief* was built at Wilmington, Del. The three-masted schooner *Josephine* followed in 1880, being built by William Cramp and Sons Company. Then there came much larger vessels in the *Tillie E. Starbuck*, built in 1883 by John Roach and Son at Chester, Pa.; and in the same year by Gorringe and Company, as the American Shipbuilding Company, the *T. F. Oakes*. These vessels were about 2,000 tons register each.

The world's recorded tonnage of merchant sailing vessels in 1850 totaled 7,701,885; of which 3,396,650 tons were British; 3,009,507 tons American; 674,228 tons French; 298,315 tons Norwegian; 289,870 Dutch, and 33,315 Belgian.

In 1900, with more complete records, the total was 9,167,620, distributed thus: United States, 2,507,042 tons; United Kingdom, 2,096,408 tons; Norway, 1,002,675 tons; France, 636,081 tons; Germany, 593,770 tons; Italy, 568,164 tons; Japan, 320,572 tons; Sweden, 288,687 tons; Finland, 287,154 tons; Russia, 269,460 tons; Greece, 175,867 tons; Denmark, 158,303 tons; Spain, 95,187 tons; Holland, 78,493 tons; Portugal, 43,874 tons; Austria-Hungary, 25,342 tons; China, 20,541 tons.

In 1911, which is representative of pre-World War conditions, the total of the merchant sailing marine was 7,454,189 tons, distributed as follows: United States, 2,564,721 tons; United Kingdom, 962,718 tons; Norway, 738,197 tons; France, 624,521 tons; Germany, 510,059 tons; Japan, 451,529 tons; Italy, 410,791 tons; Finland, 327,625 tons; Russia, 254,330 tons; Sweden, 154,968 tons; Greece (1910), 145,284 tons; Denmark, 124,510 tons; Spain, 44,325 tons; Portugal, 43,844 tons; Holland, 42,312 tons; Austria-Hungary, 32,871 tons; China, 15,679 tons.

A comparison of decades shows that the zenith figures of the sailing fleets of the several maritime nations were as follows: United States, 1861, 4,662,669 tons; United Kingdom, 1870, 4,577,855 tons; Norway, 1890, 1,502,594 tons; Italy, 1870, 980,054 tons; Germany, 1880, 965,767 tons; France, 1860, 928,000 tons; Sweden, 1880, 461,593 tons; Holland, 1860, 423,790 tons; Greece, 1870, 398,703 tons; Russia, 1880, 378,894 tons; Finland, 1911, 327,625 tons; Spain, 1880, 326,438 tons; Austria-Hungary, 1870, 279,400 tons; Denmark, 1880, 197,509 tons; Portugal, 1900, 57,925 tons; Belgium, 1850, 33,315 tons.

A comparison of these figures will give a measurably accurate view of the rise and fall of the sailing vessel in the principal maritime countries.

In the United States the zenith of the building of sailing ships was reached in 1855, when 1,781 vessels, aggregating 510,690 tons, were launched. Of these, 381 were ships, 126 were brigs, 605 were schooners and 669 were sloops.

On 30 June 1917 there were on the register of the United States 134 square-rigged vessels; 82 of these being American built and 52 built abroad. These were 38 ships totaling 77,863 tons; 55 barks, totaling 68,993 tons; 38 barkentines, totaling 37,987 tons, and 3 brigs and brigantines, totaling 940 tons. The materials of which these vessels were built were: Of wood, 81; of iron, 28; of steel, 25.

The sailing vessels of the world, of 100 tons and upward registered for the year 1930–31,

were recorded by *Lloyd's Register* as 2,717 in number and of the aggregate of 1,583,840 tons. Of the whole number 793 were British, with a tonnage of 271,504; 706 American, tonnage, 843,547; 275 Italian, tonnage, 69,304; 150 French, tonnage, 60,288; 111 Finnish, tonnage, 70,031; 111 Swedish, tonnage, 29,625; 98 Portuguese, tonnage, 26,596; 96 Spanish, tonnage, 24,644; 62 Danish, tonnage, 16,485; 47 Estonian, tonnage, 11,107. The total number of sailing vessels in the American merchant marine in 1930 was 1,584, of which 1,472 were of wood and 112 of metal. The tonnage of these was 756,792. The greater number were under 100 tons. In 1930 there were constructed in American shipyards only 8 sailing vessels, with a gross tonnage of 210, as against 28 vessels with a tonnage of 2,869 in 1925.

See also MERCHANT MARINE OF THE UNITED STATES; NAVAL ARCHITECTURE; SHIPBUILDING; SHIP SUBSIDIES; SHIPPING OF THE WORLD.

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J. H. MORRISON.

SAILOR'S CHOICE, the name of several excellent food fishes taken on the eastern and southeastern coasts of the United States, which are of small size and belong to the family of grunters. The best known, probably, is *Orthopristis chrysopterus,* also called pigfish, and especially common in the Gulf of Mexico. It is regarded as the best pan-fish of the region.

SAILOR'S CREEK, Battle of, the last great battle of the Civil War in the East. Sheridan says that it was «one of the severest conflicts of the war . . . so overshadowed by the stirring events of the surrender, three days later, that the battle has never been accorded the prominence it deserves.» When General Lee abandoned Richmond and Petersburg on the night of 2 April 1865, he ordered the concentration of his army at Amelia Court House, about 30 miles west of Petersburg, and it had collected at that point by noon of the 5th. On the night of the 5th Sheridan's cavalry and the Second, Fifth and Sixth corps of the army of the Potomac were at or near Jetersville, under orders to march early next morning on Amelia Court House. General Meade began the advance at 8.30 A.M., and when four miles out of Jetersville, Humphreys' Second corps, on the left, discovered that Lee was moving westward, passing by the flank of the Union army. The advance on Amelia Court House was suspended, and the army faced about; the Second corps was ordered to move on Deatonsville; the Fifth through Painesville, on the right of the Second; and the Sixth through Jetersville to the left of the Second. Sheridan's cavalry moved on the extreme left parallel to the Confederate line of retreat, impeding the march of the column wherever practicable, but Longstreet's corps succeeded in reaching Rice's Station, on the Lynchburg road, where he awaited the corps of R. H. Anderson, Ewell and John B. Gordon, the last-named commanding the rear-guard. The Second corps was checked at Flat Creek by the destruction of the bridge, but, soon repairing it, overtook Gordon and kept up a running fight with him for 14 miles, carrying several lightly intrenched positions, and capturing prisoners, colors, and wagons. The pursuit continued to Parkinson's Mill, on Sailor's Creek, where Gordon made a stand, but was soon driven across the creek, losing three guns, 13 colors, several hundred prisoners, and a large part of the trains of Lee's army. He attempted another stand beyond the creek, but fell back as Humphreys crossed, and marched for High Bridge. Pursuit ended at night. During the day the Second corps had captured 1,700 prisoners, four guns, 13 colors, and several hundred wagons and ambulances. While the Second corps was engaging Gordon, the Sixth corps, with the cavalry commands of Merritt and Crook, had come up some three miles to the left and overthrown the corps of R. H. Anderson and Ewell. Custer's division had interposed between Ewell and Gordon, destroying 400 wagons and taking prisoners and 16 guns; and Crook, moving rapidly to the left, found R. H. Anderson's command posted on high ground behind breastworks running across the Rice's Station road, and sent a dismounted brigade to take possession of and form across the road, thus cutting Anderson off from Longstreet. Ewell now proposed to Anderson that they make their way through the woods, around Sheridan's left, and get to Longstreet; but before anything could be done both were attacked. The Sixth corps had opened its artillery upon Ewell's 3,600 men, to which there was no reply, as Ewell was without artillery; and about 5 P.M. two divisions advanced, crossed Sailor's Creek, and attacked Ewell, who made a most determined resistance and, massing his troops, broke the centre of the Union line, but was checked by the artillery-fire from beyond the creek. The two divisions of the Sixth corps — Seymour's and Wheaton's — wheeled to the left and right respectively, enveloping Ewell's flanks; Stagg's cavalry brigade charged his right; and at the same time Merritt's and Crook's cavalry charged and routed R. H. Anderson's 6,300 men, killing wounding and capturing about 2,600. Ewell, now completely cut off and surrounded, surrendered his entire command. About 250 men of Kershaw's division, serving with him, escaped. Seven general officers were included in the surrender. The total loss of Lee's army was not less than 8,000 men. The Union loss did not exceed 900. Longstreet, who had remained at Rice's Station during the day, waiting for Anderson, Ewell and Gordon to unite with him, marched as soon as night set in, with Fields', Heth's and Wilcox's divisions, for Farmville. (See FARMVILLE AND HIGH BRIDGE). Consult 'Official Records' (Vol. XLVI); Humphreys, 'The Virginia Campaign of 1864–65'; Walker, 'History of the Second Army Corps'; Grant, 'Personal Memoirs' (Vol. II); Sheridan, 'Personal Memoirs' (Vol. II).

E. A. CARMAN.

SAILORS' SNUG HARBOR, a home for aged sailors on Staten Island, N. Y., established by Captain Richard Randall in 1800. The home is under government supervision and is in charge of a naval commander.

SAINFOIN, sān'foin, or **ESPARSETTE,** a leguminous plant (*Onobrychis sativa*), originating in the Mediterranean countries and cultivated for centuries. The stem is about two feet high, with pinnate leaves composed of small leaflets. The pea-like flowers are rather large and of a showy pink color, and are disposed in short spikes, on long axillary peduncles. It is nutritious fodder, well liked by livestock, especially sheep. It makes good hay, and will grow on light, warm, chalky soils, where other pasturage does not thrive; the roots are long-lived and are useful for binding light soils, while the foliage not only shades the pastures, but makes a good crop for plowing under. It is also recommended as a honey-producing plant for bee pastures.

SAINT, a person eminent for piety and other virtues. In the books of Scripture, both the Old and the New Testament, the whole body of the faithful people are called saints (2 Chron. vi. 41; Ps. xxxi, 3; Hebr. xiii, 14, «Salute all the saints»; Eph. i, 1, «the saints at Ephesus.») It is customary to give the title saint to all the apostles, evangelists and other holy persons, men and women, named in the New Testament, to most of the Fathers of the Church, to all the martyrs. In the Church of Rome the title of saint is formally and authoritatively bestowed on servants of God who in their lifetime were eminent for their Christian virtues and graces, and whose sanctity has been proved by miracles after their death (see CANONIZATION; BEATIFICATION); but thousands of saints are honored by that church, who lived in early times before the process of canonization was thought of. Intercession by the saints in heaven and invocation of the saints are articles of belief in the Catholic Church, Eastern and Western, as also in the schismatical Eastern churches: but that doctrine is repudiated by all the Protestant churches. The teaching of the Church of Rome, as proclaimed by the Council of Trent, is that the saints reigning with Christ «offer to God their prayers on behalf of men»; that it is good and useful «to call upon them with supplication,» and, in order to obtain benefits from God through Jesus Christ, «to have recourse to their prayers, help and aid.» Here the Church's doctrine regarding both intercession and invocation of saints is defined. Catholic divines find full warrant for this belief in the Christian sacred books; for the doctrine of intercession, in 1 Cor. xii, 12, where the unity of the Christian society is enforced; in James v, 16, where the prayer of the righteous is lauded; in Eph. vi, 18, and 1 Tim. ii, 1, where Saint Paul sets such store on the prayers of his fellow Christians; and it is asked: Can it be that the souls which have gone to God no longer exercise this kind of charity for their brethren on earth? If Scripture were silent on this question, the practice of the Church in all ages would suffice to remove all doubt as to the Apostolic origin of the belief in the intercession of saints. For the doctrine of the invocation of saints, theologians quote the word of Jesus Christ, that the angels in heaven rejoice when a sinner repents of his sin (Luke xv, 7). It were superfluous to cite the usage of the Catholic Church regarding invocation of saints: it began with the beginning of Christianity itself.

SAINT, The ('Der Heilige'). 'The Saint,' by Conrad F. Meyer (1879), is a short novel, about the length of 'Silas Marner,' centred around the great quarrel between Henry II and his Chancellor and Primate of England, Thomas Becket. In a broad sense based on history, its psychology is fancifully developed from a mediæval legend found by Meyer in 1853 in Thierry's 'Conquest of England' (Book IX), according to which Becket was the son of an Englishman and of the sister of the Kalif of Cordova. The story of Henry's amours with beautiful Rosamond Clifford in the hidden bower suggested the secret palace in which Meyer's Becket rears his daughter Grace to save her from royal lechery. The accidental slaying of Grace after her seduction by the king inspires in Becket a deep-laid plot for revenge under the veil of pretended loyalty and later of saintly devotion when he becomes Primate on Henry's nomination, whereby he drives the king to alternate fits of despair and fury over the loss of political advantages and of the love of his queen and sons. The tragic ending is historical.

The story is put in the mouth of a Swiss bowman, who is supposed to have come on his wanderings to London, where he entered the service of the king and was a minor actor in all the events he relates. The style is vivid, swift and powerful, and the diction of wonderful force and color, suggestive of a Gobelin tapestry, or as Keller said, «brocade.» It is Meyer's most finished production, possibly his best. The English reader will find it curious to compare it with Tennyson's 'Becket.' Consult 'Der Heilige' (66th ed., Leipzig 1913); American School Edition (ed. Eggert, New York 1907, with critical introduction); Frey, Adolf, 'Conrad Ferdinand Meyer' (Stuttgart 1900); Credner, Karl, 'C. F. Meyer, Der Heilige' (Berlin 1899); Langmesser, 'K. F. Meyer' (Berlin 1905).

CARL E. EGGERT.

SAINT ACHEUL, France, archæological site near Amiens which has given the name *acheulian* to the paleolithic deposits discovered there, containing flint implements evidencing human industry at a time corresponding to the second glacial period in France.

SAINT ALBANS, âl'bạnz, England, in Hertfordshire, 20 miles northwest of London, an ancient borough and market-town, standing on a height above the river Ver. Its abbey is one of the most remarkable Christian temples in England. Only a gateway remains of the original abbey, built in 793 in honor of Saint Alban, the first British Christian martyr. The present abbey has been so often extended and altered that it represents in its architecture many styles and various epochs of history, from the time of the Romans to that of Henry VII. It has the form of a Latin cross, with a length of 547 feet and breadth of 206 feet. Its tower has an elevation of 146 feet, crowned with battlements. Other churches are Saint Michael's, 10th century; Saint Stephen's, with some good Norman features, and Saint Peter's,

whose nave is of the Early Perpendicular. There is an Edward VI grammar school, and of modern buildings those deserving notice are the corn exchange, courthouse, prison, baths and public library, besides benevolent institutions, including hospitals and almshouses. The chief industries are silk manufacture, straw-plaiting, and there are breweries and iron foundries. Two battles were fought between the houses of York and Lancaster near Saint Albans; in that of 1455 Richard, Duke of York, defeated Henry VI, and in 1461 Margaret of Anjou defeated the army of York, commanded by Warwick. Southwest of the present city stood the ancient Verulamium, one of the oldest towns in Britain, on Watling street. In the abbey the printing press was set up on which the first English translation of the Bible was printed. Pop. (1951) 44,106.

SAINT ALBANS, Vt., city, port of entry, and Franklin County seat; altitude 409 feet; 32 miles north of Burlington; on the Central Vermont Railroad. Saint Albans is the trading and shipping center for an area in which hay and timber are produced and dairy farming and manufacture of maple products are carried on extensively. Here are railroad shops and offices; creameries and manufacture of poultry and stock feeds, maple products, and maple sugar-making equipment. The free public library maintains a collection of books and documents relating to the early history of the state. Beside public and parochial schools there is the Bellows Free Academy, a citizen's gift to the city. Taylor Park, in the center of the city, was given to the public by Col. Halloway Taylor in 1799; here at one time there was a town whipping post. St. Albans Raid on Oct. 19, 1864 was the most northerly engagement of the Civil War. In a scenic location, the city is favored as a summer resort. It was settled in 1763; incorporated as a town in 1788, and as a city in 1897, and is governed by mayor and council. Pop. (1940) 8,037; (1950) 8,552.

SAINT ALBANS, W. Va., city in Kanawha County; altitude 595 feet; situated at the confluence of the Coal and navigable Kanawha rivers, with steamboat service; 12 miles West of Charleston; on the Chesapeake and Ohio Railroad. It is situated in a coal mining region and in a great natural gas field. The city is largely residential, but has a lamp chimney factory, and machine shops. There is a large trade in dairy products, poultry and vegetables from the farms in the surrounding district. Very few of the inhabitants are foreign born. There are graded schools and a high school, also churches and schools for Negroes. Saint Albans is the oldest town in the Kanawha Valley and numbered Daniel Boone among its first residents. War industries in 1917–1918 inaugurated a boom period for the city and increased the population temporarily about 50 per cent. Under the revised charter of 1917 the government is vested in a mayor and six councilmen. Pop. (1940) 3,558; (1950) 9,870.

SAINT ALBANS, Confederate Raid on, a foray made Oct. 19, 1864, when Lieut. Bennett H. Young, with about 25 Confederates, nearly all of them escaped prisoners, armed with revolvers and carrying chemical preparations with which to set fire to town and farm-houses, crossed the Canada line into the town intending to burn it and rob the banks. Several citizens were killed or wounded, and three banks robbed of more than $200,000. An attempt to burn the town failed because of the defective character of the chemical preparations. Young and his party remained in town less than an hour, when they rode back to Canada on horses they had seized. Pursuit was made by United States troops, who captured some of the men on Canadian soil and turned them over to the authorities, by whom they were released on the technical ground of want of jurisdiction.

SAINT ANDREWS, Scotland, an ancient cathedral and university town in Fifeshire, located on the North Sea, 30 miles northeast of Edinburgh. Originating in the 7th century as the site of a Celtic monastery, it developed into an outstanding resort town of Great Britain.

It received its name in the 8th century when a stranger brought relics of Andrew the Apostle. In the 10th century, when St. Andrews had become a stronghold of the Celtic Church, the first cathedral was built, and during the reign of David I (1124–1153), a second cathedral was built. St. Andrews was also made a royal burgh. The third cathedral was completed in 1318. A castle built by Roger de Beaumont was destroyed by Edward I, and during the 14th century it was rebuilt, destroyed, and again rebuilt.

The first university in Scotland was founded at St. Andrews in 1412. It consists of St. Salvator's College, built in 1450; St. Leonard's College, founded in 1512; and St. Mary's College, founded in 1537. It is said that Queen Mary enjoyed respites from the cares of state by studying at St. Leonard's, which is one of the famous colleges for women in Great Britain. St. Mary's became a theological school, with the original college hall still in use. The university chapel, built in the 15th century, is the most beautiful building in the town.

During the Reformation, St. Andrews declined in importance. A Lollard and a Hussite were burned here in the 15th century, and in 1528, Patrick Hamilton was burned in front of St. Salvator's College. George Wishart was burned here in 1546, and the Cardinal Archbishop David Beaton was assassinated. Following a sermon by John Knox in 1559, the cathedral was partially sacked and destroyed; the castle was also demolished. Through these and later assults, the cathedral at St. Andrews which had been the largest church in Scotland became a ruin.

During the 19th century, St. Andrews developed as a health resort, and it has become famous as the birthplace of the game of golf. Pop. (1947) 8,693.

SAINT ANGELO CASTLE, Rome, Italy, a famous fortress situated on the right bank of the Tiber in the northwestern part of the city, opposite the bridge of Saint Angelo and a short distance from the main buildings of the Vatican. It was built by the Emperor Hadrian as a tomb for himself and his family. Originally it was a round stone tower covered with marble and surmounted by a number of statues, which, together with the marble covering, have disappeared, leaving the bare stone structure. When the Goths besieged Rome it was used

as a fortress, and has served this purpose ever since, being held and garrisoned by the party in power in the city. Since the time of Innocent III it has belonged to the popes, who strengthened the fortifications with outworks and connected the castle with the Vatican by an underground passage.

SAINT-ARNAUD, săn-tàr-nō′, **Armand Jacques Leroy de,** French soldier: b. Paris, France, Aug. 20, 1801; d. at sea, Sept. 29, 1854. He entered the French Army in 1817, but in 1822–1831 was engaged with the Greeks in their struggle for independence. He returned to the French Army in 1831, and in 1837 he went to Algeria, where he rose to the rank of maréchal-de-camp in 1847, and general of division in 1851, in recognition of his successful warfare against the Kabyle tribes. He was appointed minister of War Oct. 26, 1851, was active in promoting the *coup d'état* of December 2, and was made a marshal of France in 1852. He was placed in command of the French forces in the Crimean War and cooperated with Lord Raglan at the Battle of Alma, Sept. 20, 1854.

Consult *Lettres du Maréchal de Saint Arnaud* (Paris 1855).

SAINT ASAPH, sânt ăs′ăf, town, Wales, in Flintshire, six miles southeast of Rhyl, occupies an eminence in the Vale of Clwyd, near the confluence of the Clwyd and Elwy. It is built irregularly and has a venerable appearance. The cathedral, a small plain structure, dating from 1284, has been restored several times, and is one of the smallest in Great Britain.

SAINT-AUBAIN, săn-tō-băn′, **Andreas Nicolai de,** Danish author known by his pseudonym KARL BERNHARD: b. Copenhagen, Nov. 18, 1798; d. there, Nov. 25, 1865. He first appeared in literature as a contributor to the *Flyvende Post,* and finally obtained a large measure of success by his works of fiction, of which several dealt with higher Danish circles in modern times, while others were drawn from events of Danish history. He wrote *Kröniker fra Christian den Andens Tid* (*Chronicles from the Time of Christian II,* 1846), and *Kröniker fra Erik of Pomerens Tid* (*Chronicles from the Time of Erik of Pomerania,* 1850). A collection of his writings appeared at Copenhagen in 1856–1866.

SAINT AUGUSTINE, ā-gŭs-tēn or â-gŭs-tēn′, city, Florida, seat of Saint Johns County, on the Atlantic coast about 38 miles southeast of Jacksonville. It is situated on a peninsula formed by the San Sebastian River on the west, and the Matanzas River and the Intercoastal Waterway on the east and south. It is served by the Florida East Coast Railroad, and by U.S. Highway 1; also by several state highways. Saint Augustine is the oldest white settlement in the United States. It was founded September 8, 1565, by Don Pedro Menéndez de Avilés, captain general of the Spanish Fleet, and remained under Spanish control until 1763, when, together with the remainder of Florida, it was ceded to England. The British occupied the city until 1783, when Florida was re-ceded to Spain. By treaty of 1819 Spain ceded Florida to the United States in settlement of claims of United States citizens against Spain, not to exceed five million dollars. Possession was taken in 1821.

Established as a military post, Saint Augustine remained pretty much that until in the 1880's when the late Henry M. Flagler, one of the founders of the Standard Oil Company, decided to make it into a great winter resort. Until it became American, Saint Augustine experienced many vicissitudes. Menéndez had established it as a base for operations against the French who had set up a colony on the Saint Johns River. He called it Saint Augustine because he made the landfall on the feast day of the saint, August 28, 1565. In 1586, Sir Francis Drake sacked and burned the town. It was again sacked by pirates in 1668, and in 1702 was besieged by a band of Carolinians. Eventually they abandoned the siege, but before doing so, burned the town, making the third time it had been reduced to ashes by an invading force. In 1727, Colonel Palmer of Carolina made a sortie against the Spanish and Indians in Florida, and carried desolation and destruction to the very gates of Saint Augustine. And in 1740, Governor James Oglethorpe of Georgia led a joint expedition of Georgians and Carolinians against Saint Augustine but failed to win the city though he did take all of its outlying defenses. That he and others failed to capture the city itself was due to the fort which the Spaniards had erected at the northern approach to it, and which they called Castillo de San Marcos. It stands today, a splendid example of military architecture of its time, and was made a national monument in 1924. Of the numerous historical attractions in Saint Augustine, it is the foremost. It was begun in 1672 and was not completed for 87 years. It is built of coquina stone, quarried nearby. See also NATIONAL PARKS AND MONUMENTS.

In 1762 Spain and England were at war. The English captured Havana. England then proposed a treaty by which she would release Cuba to Spain in exchange for Florida. Spain agreed and the treaty was ratified February 10, 1763. Under the British, Saint Augustine prospered. In 1772, they exported 40,000 pounds of indigo which brought the highest prices on the London market. Other exports increased correspondingly. Soon after the United States acquired Florida the Seminole War broke out. This resulted in the Dade massacre on December 28, 1835, when Maj. Francis L. Dade, with a command of 139 men, was surprised by the Indians, and he and all but four of his men were killed. The Civil War had but little effect on Saint Augustine. In 1870, it had a population of but 1,800. The first railroad to reach the town was one 14 miles long extending to the town of Tocio on the Saint Johns River. This brought visitors, among them Mr. Flagler. The latter built the Ponce de Leon Hotel, a highly ornate structure that still stands. He also built the Alcázar, now a museum, and set up headquarters for his Florida East Coast Railroad, and for the chain of hotels which he erected along the Florida East Coast.

Because of its historical interest, Saint Augustine has become one of the most frequented resorts in the country. Among its many sights worth seeing, in addition to Castillo de San Marcos, may be mentioned, the Oldest House, the Oldest Wooden Schoolhouse, the City Gates, the Governor's House, the Old Spanish Inn, the Spanish Treasurer's House, Treasury Street, the narrowest in the city of many narrow streets, Ponce de Leon Circle, the Plaza de la Con-

SAINT AUGUSTINE

Philip Gendreau, N.Y.

Bridge of Lions

Philip Gendreau, N.Y.

Old city gates, sole remains of city walls built in 1620.

Ewing Galloway, N.Y

Quaint St. George Street with post office at left

SAINT AUGUSTINE

Oldest house in the United States.

Ewing Galloway, N.Y.

In old St. George Street, just inside the city gates, stands the oldest schoolhouse in the United States.

stitucion, the Catholic Cathedral, Trinity Episcopal Church, the Slave Market, the Fountain of Youth, and many other objects of real interest. Near Saint Augustine is the famous Alligator Farm, with literally thousands of alligators, one estimated to be 900 years old; also Casper's Gator and Jungle Ostrich Farm, while 18 miles south of the city is the famous Marine Studios, with thousands of fish of all varieties.

Saint Augustine has a commission-manager form of government. Its shrimp fisheries are extremely important. It builds boats, makes shell novelties, fishing tackle, and other small wares. Here are located the repair shops of the Florida East Coast Railroad. There are two hospitals—the Flagler and the East Coast. (The East Coast Hospital has been called the Saint Augustine Clinic since moving to new quarters). Pop. (1950) 13,418.

SAINT AUSTELL, ôs't'l, urban district, England, in Cornwall, 14 miles northeast of Truro, on Saint Austell Bay. It is the market town for a considerable agricultural district. China clay (kaolin) is produced in the neighborhood. Pop. (1951) 23,634.

SAINT BARTHELEMY, or SAINT-BARTHELEMY, săn bàr-tāl-mē', French West Indies, in the Department of Guadeloupe, Leeward Islands. It is about nine square miles in area, of irregular form and mountainous. Although nearly treeless it is fertile; vegetables are cultivated in some of the valleys, and bananas, Cassia, tamarinds, and sassafras are exported. Rocks and shallows make access to the island difficult for any but the larger coasting craft. Lead and zinc ores have been found in the island. The principal town is Gustavia, a seaport on the southwest coast; the only other town is Lorient. Saint Barthélemy was first occupied by the French in 1648. It was ceded to Sweden in 1784; and in 1877 it was reacquired by France through purchase. Slavery was abolished in 1848. The people are of French and Negro descent. Pop. (1938 est.) 2,479.

SAINT BARTHOLOMEW, Massacre of. Name given to the murder of the Huguenots in France which began on St. Bartholomew's Day, Aug. 24, 1572. Its authorship is usually attributed to the king's mother, Catherine de' Medici, but its causes were probably more complex. It began with a plot to murder Coligny, whose influence with the king was dreaded by the queen-mother and others. This failed, but it aroused a good deal of suspicion, and both sides prepared for bloodshed. Taking advantage of the presence of many Huguenots in Paris, they having come to attend the marriage of Henry of Navarre and the king's sister Marguerite, Catherine, backed by the Guises and others, persuaded Charles IX to strike at their foes. He consented, and the massacre began in Paris, and then spread to the provinces, lasting until October 3. One authority states that 50,000 were killed, but 25,000 is probably nearer the mark. Gregory XIII, misinformed, ordered a *Te Deum* and had a medal struck depicting an angel with cross and drawn sword slaying the Huguenots (q.v.).

SAINT BENEDICT'S COLLEGE, a Roman Catholic institution for men at Atchison, Kansas. It was founded in 1858 by the Benedictine Fathers. Four-year courses of study lead to the degree of bachelor of arts, while the degree of master of arts is conferred for two years' postgraduate study. . Enrollment (1950–1951) 515.

SAINT BERNARD, city, Ohio, in Hamilton County; 6 miles north of Cincinnati; on the Baltimore and Ohio; New York Central; Norfolk and Western; and Pennsylvania railroads. There are manufactures of soap, stearic acid, chemicals, car wheels and lumber. Near by is Ivorydale, soap manufacturing center. Pop. (1940) 7,387; (1950) 7,066.

SAINT BERNARD, săn bĕr-nàr', the name of two passes across the Swiss Alps, connecting Valais, Switzerland, with Piedmont department, Italy, known respectively as Great Saint Bernard and Little Saint Bernard.

Great Saint Bernard (French Grand-Saint-Bernard), 8,111 feet above sea level, was known to the Romans as *Alpis Poenina.* It is 15 miles east of Mont Blanc, and leads from Martigny, Switzerland, to Aosta, Italy, a distance of 50 miles; on the east side of the pass is Mount Velan, and on the west side the Point de Dronaz. It was known to the Romans as early as 57 B.C., when it was crossed by Servius Galba on the instructions of Julius Caesar. A military road was in existence by 79 A.D., traces of parts of it still being visible. There are remains of a temple of Jupiter Poeninus on the plain at the top of the pass, dating from the early days of the Roman Empire; it was excavated in 1890–1893. Votive tablets, some of which date from the time of Tiberius, bronze objects of the first Iron Age, Gaulish coins, and other antiques found in the vicinity, were deposited in the museum of the hospice which stands at the summit of the pass. This famous hospice, one of the highest permanently inhabited places in Europe, was founded in 962 by Saint Bernard of Menthon, and was maintained primarily for the relief of travelers lost in the snows or exhausted by the rigors of the journey. It is in charge of Augustinian monks who, with their celebrated dogs, have saved countless lives. When, with improved roads and communications, there was a decreased demand for these humane services, the monks established a hospice in the mountains of Tibet.

Little Saint Bernard (French Petit-Saint-Bernard), 7,177 feet high, was known to the Romans as *Alpis Graia.* Situated about 10 miles south of Mont Blanc, it connects the valley of the Isère, on the west, with that of the Dora Baltea, in the east. The pass across it is one of the easiest in the Alps. It is believed to have been the pass by which Hannibal led his forces into Italy in 218 B.C. There are remains of a Roman road and temple; and it, too, has a hospice founded in the 11th century, and administered by the Order of St. Maurice and St. Lazarus.

SAINT BERNARD DOG, a race of large dogs which gets its name from the Hospice of Saint Bernard, where it has long been kept by the monks to aid them in rescuing perishing travelers. This dog is very valuable in assisting the monks to keep to the line of the road and in finding their way back. They are seldom burdened. Dogs of other races are used for the same purpose in other parts of the Alps. The Saint Bernard dog is of two varieties: the rough and the smooth coated; the first, which has long white hair with black or tawny spots are few in

number. This famous dog, according to the traditions of the monastery, is the result of a cross between a Danish-bull bitch and a mastiff, a native hill dog, though at what time effected it is impossible to say. After the breed was once established it was kept pure till 1812. About 1860 these dogs first attracted attention of English travelers, who imported them to Great Britain, where they were exhibited and at once excited much notice on account of their size and beauty. Others were introduced, and the Saint Bernard was soon established as the most popular big dog, a popularity which has gone on increasing. The Saint Bernard, as bred to modern English ideas, is an immense red or orange colored dog, marked with white on muzzle, neck, chest, feet and tip of tail. The head should be massive and imposing, with a strong square muzzle, a point of great importance. Legs should be straight, with large feet, and double or, at least single, dew claws. Hind feet should turn out, though not sufficiently to hinder the dog's movements. The coat of the rough variety is of medium length; it should not be too curly. In the smooth variety the coat should be short and wiry. See also Dog—*Working Dog Group.*

SAINT BONIFACE, city, Province of Manitoba, Canada, county seat of Provencher County, on the east bank of the Red River, immediately opposite the city of Winnipeg with which it is joined by three bridges and by the Canadian National and Canadian Pacific railways, bus, and street railway services. Originating in a mission and settlement founded by the Abbé Provencher in 1818, and now the seat of a Roman Catholic archdiocese, with a cathedral which is one of the largest of church buildings in Canada, it was incorporated as a city in 1908, and is noted as the chief marketing center for livestock in the province and for its meatpacking and miscellaneous industries. The city has three public schools and a collegiate institute, a seminary, a normal school, a Roman Catholic college, a weekly newspaper, and two hospitals. The harbor on the Red River is administered by a commission of five of which Winnipeg appoints three members and St. Boniface two. Population (1951) 26,342.

SAINT BRIEUC, săn-brē-û′, city, France, capital of the Department Côtes-du-Nord, 55 miles northwest of Rennes. It is built on a hill rising 290 feet above the right bank of the river Gorrët, a mile from its outlet, in its port of Le Légué, on the bay of Mont Saint Michel. A considerable coasting trade is carried on in fish, garden and farm products, and the manufacturing industries include iron, steel and agricultural implement works, lumber, brush and wool factories. The city dates from a monastery established by the Welsh missionary Saint Brieuc, in the 5th century, and has had a turbulent history, especially during the 18th century Reign of Terror. The 13th century restored cathedral, a church of the same period, the modern church of Saint Michael, the bishop's palace, the city hall with its museum and picture gallery, the military barracks, formerly an Ursuline convent, a statue of Du Guesclin, and the colossal statue of the Virgin on a dominating northern hill are among the chief features. Pop. (1946) 28,596.

SAINT CASIMIR, Institute of the Sisters of. See Orders, Religious.—*Roman Catholic Orders*—Orders of Women.

SAINT CATHARINES, city, Province of Ontario, Lincoln County seat, on the Welland Ship Canal, and on several branches of the Canadian National Railway, 12 miles northwest of Niagara Falls, 32 miles east of Hamilton. St. Catharines is noted for its mineral wells, has large hotels and is in a picturesque and fertile region. Manufactures include electrical equipment, tools, locks, drop forgings, textiles and leather. It is the center of the Niagara Peninsula fruit trade; ocean-going boats in the Welland Ship Canal stop at its docks. Educational facilities include numerous public and private schools, among them Ridley College. Pop. (1951) 37,984.

SAINT CHAMOND, săn shà-môn′, France, in the Department of Loire, eight miles northeast of St. Etienne by rail, at the confluence of the Gier and Janon, is a well-built manufacturing city. There are large coal mines in the vicinity, famous dye-works and extensive metallurgical manufactures and various other industrial works, including large mills for the manufacture of silk and lace. The remains of a Roman aqueduct are found at St. Chamond. Pop. (1946) 14,546.

SAINT CHARLES, city, Illinois, in Kane County; altitude 802 feet; on the Fox River; 38 miles west of Chicago; on the Chicago and North Western and Chicago Great Western railroads; has airport. Metal kitchen and dining furniture, custom kitchens, molded fiber products, plastic enclosures, water softeners, letterpress and offset printing, and sound equipment are made here. The city has a memorial community center and also a fine municipal building of Georgia marble. It is the home of a livestock center where pure bred cattle are bought and sold in sales sponsored by breeding associations. Pop. (1940) 5,870; (1950) 6,709.

SAINT CHARLES, city, Missouri, Saint Charles County seat; alt. 504 feet; on the Missouri River; 23 miles northwest of St. Louis; on the Wabash; and the Missouri, Kansas and Texas railroads; state and federal highways; and with both railroad and highway bridges across the river. The industrial and shipping center of an agricultural district devoted to grain and general farm crops, the city also has railroad car and foundry companies, and manufactures shoes and steel dies. There are, as well, deposits of sand, gravel and coal. Cultural facilities include a public library; the Sacred Heart Academy, founded in 1818; and Lindenwood Female College, an institution of higher learning, established as a school for girls by Maj. and Mrs. George C. Sibley in 1827. It received the Sibley estate as an endowment and is under the auspices of the St. Louis Presbytery. St. Charles was settled in 1769 by the French, under the leadership of Louis Blanchette; came under the Spanish rule for a brief period; was receded to the French; and became a part of the United States with the Louisiana Purchase. It was incorporated in 1795; was the first capital of the state, in 1820–1826; and received its city charter in 1849. Government is by mayor and council, and the water supply is municipally owned. Pop. (1940) 10,803; (1950) 14,314.

SAINT CHARLES, Engagement at, occurred during the American Civil War; it was fought on June 17, 1862, on the White River at Saint Charles, Arkansas County, Ark. On the orders of Gen. Henry Wager Halleck (q.v.), Capt. Charles Henry Davis, commanding the Federal flotilla on the Mississippi, despatched two ironclad vessels and two wooden gunboats to open the White River for communication. At Saint Charles they encountered a fortified Confederate position and took it by assault after the *Mound City,* one of the ironclads, had been crippled by gunfire; this successful action gave control of the White River to the Federals.

SAINT CHARLES COLLEGE, Catonsville, Md., is the classical department of Saint Mary's University and Theological Seminary of Saint Sulpice, at Baltimore, Md. It was founded on July 11, 1831, at Ellicott City, Md., the land and an endowment of $5,349 being provided by Charles Carroll (q.v.), one of the signers of the Declaration of Independence. The institution was not opened until October 1848. After destruction of the buildings by fire on March 11, 1911, the college was removed to Catonsville. In 1946–1947 there were a faculty of 12 and student enrollment of 200 men.

SAINT CHRISTOPHER, popularly known as **SAINT KITTS,** British West Indies, an island of the Leeward Islands colony, situated 46 miles west-northwest of Antigua. The length is 23 miles and breadth 5 miles, the area being 68 square miles. It is traversed by a densely-rugged mountain range whose highest summit, Mount Misery, has an altitude of 3,771 feet. The island has a healthful climate, and considerable cultivation is carried on in the coastal lowlands. Sugarcane is the principal economic crop, and other products include cotton, cacao, coffee, tobacco, limes, and coconuts. Basseterre (pop. 12,000), a town on the southwest coast, is the capital and principal seaport; other towns are Old Road and Sandy Point. Administratively, Saint Christopher and Nevis (q.v.), lying 2 miles to the southeast, constitute (together with the dependent island of Anguilla) one of the four presidencies of the Leeward Islands colony; the presidency has an aggregate area of 152 square miles, and the population numbers 46,300. Head of the government of the presidency is an administrator, who is assisted by a Legislative Council of 11 members comprising 3 officials and 8 unofficials (5 of the latter being elected and 3 nominated). Sugar companies operate 36 miles of railways in Saint Christopher; and there are some 60 miles of highway suitable for automobile traffic. Air transportation services link Basseterre with other islands of the British West Indies and with Willemstad, Curaçao. The island was discovered by Christopher Columbus in 1493. British settlers were taken there in 1624 by Sir Thomas Warner (d. 1649), and Frenchmen arrived shortly afterward. Both Britain and France exercised sovereignty over parts of Saint Christopher until 1713 when, by the Treaty of Utrecht (q.v.), all French rights to the island were ceded to Great Britain. Pop. (1944) 17,992.

ST. CLAIR, Arthur, American army officer: b. Thurso, Caithness, Scotland, March 23, 1736; d. Greensburg, Pa., Aug. 31, 1818. A grandson of the Earl of Roslyn, he attended the University of Edinburgh and studied medicine prior to 1757, when he became an ensign in the British Army. He sailed for America in the fleet of Admiral Edward Boscawen (q.v.), and during 1758 served under Baron Amherst (q.v.) at the capture of Louisburg and under James Wolfe (q.v.) in the successful assault on Quebec. Resigning his commission in 1762, he settled first at Boston, Mass., where he married a niece of James B[illegible]doin (q.v.), later governor of Massachusetts. Two years later he moved to the Ligonier Valley of western Pennsylvania, where he had been assigned large grants of land because of his military service. The largest resident landowner in Pennsylvania west of the Alleghenies, he became surveyor of the district of Cumberland in 1770 and judge of quarter sessions and common pleas in 1773. With outbreak of the Revolution he cast his lot with the colonies, and thus was drawn into a military and political career that brought him prominence but little fame, many humiliations and disappointments, and ultimately poverty and oblivion. Appointed colonel of the 2d Pennsylvania Regiment in 1775, he served under John Sullivan in the disastrous raid into Canada; promoted brigadier general in 1776, he organized the New Jersey militia and fought at Trenton and Princeton. Becoming major general in 1777, he succeeded Gen. Horatio Gates (q.v.) in command at Ticonderoga, but with the approach of British troops under Gen. John Burgoyne (q.v.) he evacuated the fort (which had been considered impregnable) without a fight; for this action, he was court-martialed in 1778 but was fully exonerated. In 1780 he served on the court-martial which convicted Major John André (q.v.), and during 1781–1782 he was in command of forces serving in Georgia and the Carolinas under Nathanael Greene (q.v.). He was made a member of the Continental Congress in 1785, and became its president in 1787. That same year he was appointed the first governor of Northwest Territory, and this post he continued to hold for 15 years; in 1790 he selected as site for his headquarters a place to which he gave the name Cincinnati, thus commemorating the Society of the Cincinnati, of which he had been president for Pennsylvania from 1783 to 1789. As major general in command of federal troops during 1791 he conducted a campaign against the Miamis, but on November 4 he was thoroughly routed at Saint Mary's by Little Turtle (q.v.) in one of the most severe defeats ever inflicted on white men by Indians; the next year he resigned his army command although Congress had freed him of blame. He continued as territorial governor, however, but he was overbearing in his treatment of the white inhabitants and outraged them by his unyielding tactics. When Congress, ignoring his protests, finally arranged for establishment of the State of Ohio, he announced to the Constitutional Convention that the act of Congress was illegal; because of this action, in 1802 the long-patient President Jefferson removed him from the governorship. Thereafter he lived in poverty for some years until Congress acknowledged his claim for the refund of monies expended. He wrote *A Narrative of the Manner in Which the Campaign Against the Indians in the Year 1791 was Conducted* (1812). Consult Burger, Nash K., *Arthur St. Clair* (Richmond 1945).

SAINT CLAIR, city, Michigan, in St. Clair County; altitude 604 feet; on the St. Clair River (q.v.); 11 miles south of Port Huron; on the Port Huron and Detroit Railroad, with ferry to Courtwright, in Ontario, Canada. Nearby farms produce grains, hay and vegetables. Exploitation of large salt deposits underlying the city is the foremost industrial activity. The city has standard schools, recreational facilities, and civic and social welfare institutions.

A British fort was established here in the 1760's, to safeguard transport of supplies, but was abandoned after some 20 years of use. St. Clair was platted in 1818, and replatted 10 years later. In its early years it was a lumber center. Incorporation as a city was effected in 1858. Pop. (1940) 3,471; (1950) 4,098.

SAINT CLAIR, borough, Pennsylvania, in Schuylkill County, altitude 749 feet, three miles north of Pottsville. It is served by the Philadelphia and Reading Railroad. It is an anthracite region and the chief industries are connected with the mining and shipping of coal. The government is by president and council. Pop. (1950) 5,856.

SAINT CLAIR, river, Michigan (called originally SINCLAIR), in honor of Patrick Sinclair, a British officer, who in 1765 purchased from the Indians a tract of land along the river. The river is the outlet of Lake Huron, and discharges its waters by several channels into Lake St. Clair The delta at the mouth is known as the Saint Clair Flats. A number of summer cottages and hotels have been built on the Flats. One of the channels has been improved for navigation; a canal about one and one half miles long has been built at such an angle as to shorten the course, and of such a width and depth as to admit large lake steamers. A railroad tunnel under the river connects Port Huron in the United States with Sarnia in Canada. It is nearly two miles long, including approaches, and was opened for travel in 1891. The river is about 40 miles long.

SAINT CLAIR, sânt klâr′, **Lake,** between Michigan and Ontario, Canada, and between Lake Huron and Lake Erie. It receives the waters of Lake Huron through St. Clair River and discharges its waters into Lake Erie through Detroit River. It is about 30 miles long, from north to south; its maximum width is 24 miles and the average width 12 miles; area, 460 square miles. It is about three feet higher than Lake Erie and five feet four inches lower than Lake Huron. The northern part is shallow, owing to the sediment from St. Clair River; the average depth of the central part is 26 feet. The bed is covered with a blue mud, with sand and gravel in some parts, all supporting a dense growth of low vegetation in which are many forms of animal life. The lake is noted for the large number of steamers and the enormous tonnage which it carries each year.

SAINT CLOUD, săn klōō′, city, France, in the Department of Seine-et-Oise, on a height near the Seine, seven miles west of Paris, is charmingly situated and especially interesting for its historical associations. It commands a superb view of Paris, and the beautiful shady park, with its château and elegant fountains, is a favorite resort of Parisians. Within the precincts of St. Cloud are situated the new national Sèvres porcelain manufactory. The château was built by Gondi in 1572, purchased by the duke of Orléans, the brother of Louis XIV in 1658, and by Louis XVI for Marie Antoinette in 1782. Henry III was murdered in the old mansion by Jacques Clement Aug. 21, 1589 Peter the Great was received there in 1717. It was the scene of Napoleon's coup of the 18th Brumaire, and his favorite residence; here he caused himself to be declared first consul, and here Blücher had his headquarters (1815). At St. Cloud, Charles X (1830) affixed his signature to the ordinances which doomed him. Here Napoleon III signed the declaration of war against Prussia (1870). Pop. (1946) 17,101.

SAINT CLOUD, sânt kloud′, city, Minnesota, and Stearns County seat, altitude 1,032 feet, on the Mississippi River, 70 miles northwest of the Twin Cities, Minneapolis and St. Paul. It is served by the Great Northern and Northern Pacific railways, by three bus lines and one airline.

In 1870 the first granite quarry was opened in St. Cloud. Today the famous St. Cloud granite is known throughout the world and the city ranks first in the nation in the production of colored granite and second in the production and processing of all types of granite.

Because of the city's strategic position in the center of the state, St. Cloud has become an important focal point for both industry and the large tourist trade. It is Minnesota's fifth largest city

Industry is widely diversified. There are large railway car manufacturing shops. Other important industries include an optical works, factories for the production of floor sanding machines, refrigerators, boats, playground equipment, brooms, airline tanks, neon signs, frost shields, and many other products. The processing of dairy products is of major importance as St. Cloud is located in the heart of one of the largest dairying regions in the United States.

The city is well-equipped with modern schools, both public and parochial grade and high. The St. Cloud State Teachers College is located here. St. John's University for men and St. Benedict's College for women are situated in beautiful settings within a few miles of the city. A county historical museum is located in the city. The Carnegie library, opened in 1902, has paintings and mementoes of St. Cloud in France, for which this Minnesota city was named. The courthouse is built of Minnesota granite, as is the post office. The courthouse, library, and post office are grouped centrally, near the river. Local institutions are the fine modern St. Cloud Hospital; an orphanage, and a neighborhood house. The women's club guild conducts an active philanthropy, and there is a civic music association. State and federal institutions are a reformatory and a veterans hospital.

St. Cloud was settled in 1852, platted in 1854, incorporated as a village in 1868 and chartered as a city in 1889. Since 1912 it has had a commission-council form of government. Before the days of the railroads it was the terminus of the Hudson's Bay Company for unloading the furs brought down from the Red River Valley in wooden oxcarts. The first stage line came through in 1851, and in 1866 the railroad reached St. Cloud. Pop. (1940), 24,173; (1950) 28,410.

SAINT CROIX, sânt kroi′, (1) a river, the outlet of Grand Lake, flows south, east-southeast, and forms part of the boundary between Maine and New Brunswick. It empties into Passamaquoddy Bay It is 75 miles long; navigable as far as Calais, Me., above which there is extensive water power. (2) A river which rises in Douglas County, Wisconsin, flows southwest to the Minnesota border, then south, forming the boundary between Wisconsin and Minnesota for a distance of about 100 miles, entering Mississippi River at Prescott, Wisconsin. It is about 150 miles long and navigable to the Falls or the Dalles, a distance of 54 miles from its mouth. At the Falls there is a descent of 50 feet in 900 feet, and below there is a canyon.

SAINT CROIX, sânt kroi′, the largest of the Virgin Islands of the United States, lying 60 miles east by south of Puerto Rico; area 81.93 square miles. It is hilly except in the southern part; well-watered, and fertile, and has a larger proportion of land under cultivation than the other islands of the group. Sugar is the chief product; tobacco, cotton and fruits are also cultivated. Some cattle are raised.

The island was discovered by Columbus in 1493, and was occupied by the Dutch, the English, the Spaniards, and the French. Ceded to Denmark by France, it was occupied by the English in 1807, but finally restored to Denmark by the Treaty of Paris. It came into the possession of the United States by purchase on March 31, 1917. Pop. (1950) 12,096. See also Virgin Islands of the United States.

SAINT-CYR, săn-sēr′, Marquis **Laurent de Gouvion,** marshal of France: b. Toul, France, April 13, 1764; d. Hyères, France, March 17, 1830. In 1807 and 1808 he fought in the Polish campaign and in the Russian campaign of 1812 in which he distinguished himself by winning the Battle of Polotsk in recognition of which he was made a marshal. After the overthrow of Napoleon he made his peace with the new regime, was minister of war in 1815, and was created a marquis in 1817. His *Memoirs* are records of the campaigns in which he fought.

SAINT-CYR, or **SAINT-CYR-L'ECOLE,** săn-sēr′ lā-kôl′, town, France, in Seine-et-Oise Department, 3 miles west of Versailles, at the end of the old park of Louis XIV, celebrated for its military school. Madame de Maintenon founded here (1686) a seminary for the education of the daughters of families of high rank in reduced circumstances. The convent chapel contained the tomb of Madame de Maintenon, and Racine's *Esther* and *Athalie* were written for the pupils of the school and first acted there. During the Revolution this institution was abolished, and in 1806 Napoleon transferred to St.-Cyr the famous military academy which he had founded at Fontainebleau. Two advanced forts of the new enceinte around Paris are situated at St.-Cyr. Pop. (1946) 4,288.

SAINT DAVID'S, dā′vĭdz (anc. Menevia), town and parish, Wales, in Pembrokeshire, 14 miles west-northwest of Haverford. Its famous 12th century cathedral is one of the most beautiful in Wales. Pop. (1951) 1,580.

SAINT-DENIS, săn-dē′, city, France, in the Department of Seine, four and one half miles north of Paris, is an important junction on the Northern Railroad. The town is especially celebrated for its venerable abbey, from which it derives its name; the two high towers are respectively Romanesque and Gothic; the rose window dates from the 13th century. The abbey was the burial place of the kings of France and in the chapels of the nave are the tombs of Louis XII, and Anne of Brittany (1591); of Henry II; Catharine de Medici; Louis of Orleans; Francis I; and Claude of France—one of the splendid tombs of the Renaissance; and that of Dagobert, one of the most curious of mediaeval (13th century) works of art. The crypt dates partly from the time of Charlemagne. In the center is the vault, where the last king reposes—Louis XVIII, the only one whose ashes have been respected. The crypt also contains the Bourbon vault, where reposes Louis XVI and Marie Antoinette. Modern features deserving notice are an orphanage (1886), the monument commemorative of the revolution and other public statues, and the railway station. Pop. (1946) 68,595.

SAINT-DENIS, city, capital of the French island of Réunion in the Indian Ocean, on the north coast of the island. It is built on a long, narrow beach shut off on the land side by a range of high volcanic mountains. In the city are a cathedral, a palace for the governor, a theatre, and a large number of educational institutions, including a lyceum, several large schools, a library, a museum, and a botanical garden. The harbor is an open roadstead exposed to frequent severe storms, but a new, protected harbor has been constructed at Pointe des Gallets, a few miles to the west, which is connected with the city by a railroad. Pop. (1946) 25,332.

SAINT-DIZIER, săn-dē-zyā′, town, France (ancient Desiderii Fanum), Department of Haute-Marne, on the Marne, 35 miles southeast of Châlons. Part of the old castle is standing and the church has some peculiar Gothic windows. There is a library and a museum. It is an important center of the iron trade, with foundries of iron, steel, copper and bronze, engineering works, etc. It is a railway station. In 1544 St. Dizier was besieged and taken by Charles V, although strongly fortified. In 1814 there was severe fighting nearby, between Napoleon and the Allies. The walls have been razed and the site now constitutes the promenade of the town. Pop. (1946) 15,936.

SAINT ELIAS, Mount, in Alaska, in the southeastern part of the territory; long. 140° 55′ 47.3″ W.; lat. 60° 17′ 35.1″ N. The United States Coast and Geodetic Survey report the height 18,108 feet above sea level. It rises from an elevation of considerable height, and the foot-hills on the south side are covered with trees. The timber line is from 2,000 to 2,500 feet above sea level. The mountain itself is covered with snow and ice and has many glaciers The south side is almost perpendicular; the storms of ages and the avalanches have removed many of its rugged features. The north side is more accessible, and has been explored to some extent The Malaspina Glacier is on the slope and at the foot of Mount Saint Elias, near Yakutat Bay.

SAINT ELMO CASTLE, Naples, Italy, a fortress crowning a rocky hill on the western outskirts, built by Robert the Wise (1343).

SAINT ELMO'S FIRE, the popular name of an electric appearance, especially in southern climates, during thunderstorms, of a brush or star of light at the tops of masts, spires, or other objects.

SAINT-ETIENNE, săn-tā-tyĕn′, France, manufacturing city of the department of the Loire, and its capital, situated on the Furens, 36 miles southwest of Lyon. It is located amid some of the richest coal fields of France. The important buildings include the old abbey of Valbenoite, dating partly from the 13th century, a Protestant church, a synagogue, a town house, a school of mines with fine collections, and an art palace, with a museum and library, rich in old manuscripts, collections of natural history, and of ancient artillery. The enormous metallurgical establishments yield one third of the whole French production of steel. Here are also the national gun factory and other metal works. The manufacture of hemp cables, pottery, and lime, the weaving of ribbon, laces, trimmings, and conditioning of silk are among the active industries of the city. Pop. (1946), 177,966.

SAINT EUSTATIUS, sânt ū-stā′shĭ-ŭs, Netherlands Antilles, island 12 miles west of St. Kitts and 16 miles southeast of Saba, 12 square miles in area. It is of volcanic origin. In the southern part is an extinct cone 1,975 feet in height; and in the northern part a second rises to 965 feet. The land is used principally for the pasturing of sheep, goats, and cattle, the former plantations of tobacco, sugarcane, and other crops having long since disappeared. Oranjestad, the capital, was at one period the chief commercial port of the West Indies.

Saint Eustatius, known to its inhabitants as Statia, was first occupied by the Dutch in 1635. It became an important trading center in the 18th century, and during the American Revolution the island was one of the chief sources of supply for the forces of General Washington. Here, on Nov. 16, 1776, the Dutch governor, Johannes de Graeff, ordered the first foreign salute to be fired in honor of the "Congress flag," this being flown by the brig *Andrea Doria,* commanded by Capt. Josiah Robinson. On Feb. 3, 1781, the island was captured by a British fleet commanded by Admiral Sir George Rodney, and this struck a blow to its prosperity from which it did not recover after return to Dutch sovereignty in 1814. Pop. 1,209. See also Netherlands Antilles.

SAINT-EVREMOND, Charles de Marguetel de Saint-Denis, Seigneur de, săn-tā-vrē-môn′, French wit and littérateur: b. Saint-Denis-le-Guast, April 1, 1610; d. London, England, Sept. 29, 1703. He fought in the Thirty Years' War and became a favorite of the prince de Condé (duc d'Enghien), but, though a royalist, he fell into disfavor because of his criticism of the Peace of the Pyrenees (q.v.) and in 1661 fled the country. By way of the Netherlands he reached England, where he became a favorite of Charles II. During 1664–1670 he resided in the Netherlands, and thereafter once more he lived in England until his death. For long he was closely associated with Hortense Mancini, duchess of Mazarin, a leader of fashion in London. He wrote dramas, essays and letters that earned him European fame as scholar and wit.

SAINT-EXUPERY, săn-tăg-zü-pā-rē, **Antoine de,** French aviator and writer: b. Lyon, 1900; d. southern France, August 1944. Becoming a commercial pilot in 1926 after service as a military flyer, he was employed on the routes to West Africa, South America, and the Sahara. Drawing from these experiences, he was inspired to write three notable books known in English translation as *Night Flight* (1932), *Southern Mail* (1933), and *Wind, Sand, and Stars* (1939). The poetic quality of these works earned for him the Prix Femina-Vie Heureuse in 1931 and the award of the grand prize of the French Academy in 1939. Rejoining the French Army air service at outbreak of World War II, his plane was shot down in May 1940 as the resistance of France to the German onslaught was drawing to its close. Making his escape from France, by way of Portugal he reached the United States, and there wrote *Flight to Arras* (1942), a dramatic account of his last reconnaissance flight. He also wrote *Airman's Odyssey* (1943), recounting his escape, and *The Little Prince* (1943), the latter a child's fantasy. Joining the French forces resisting the Germans in France, he was reported missing when engaged in a flying mission over southern France.

SAINT FRANCIS, a river rising in southeastern Missouri and flowing 450 miles to join the Mississippi at Helena, Ark. It is navigable for 150 miles.

SAINT FRANCIS COLLEGE, Brooklyn, N. Y., was founded by the Jesuits in 1847 and was granted powers of a university in 1861. Originally on the island of Manhattan, it was removed to Brooklyn in 1913. There is a faculty of 40 and a student enrollment of 850.

SAINT FRANCIS OF ASSISI. See Canticle of the Sun; Francis of Assisi.

SAINT GALLEN, sânt gäl-ĕn (French, Saint Gall, săn gàl′), Switzerland, name of a canton and of its capital. 1. The canton, in the northeast, is bounded by Lake Constance (Boden See), the Rhine, and the lakes of Zürich and Walen. With an area of 777 square miles, it has a diversified surface, the southern and central portions being covered by lofty Alpine ranges. While the climate of the valley is mild, it is rigorous in the mountainous district. There are good pastures, vineyards, and orchards. The canton, which was admitted to the Swiss Confederation in 1803, sends 13 representatives to the Nationalrat (National Council). German is the main language, and the majority of the inhabitants are Roman Catholic. Pop. (1941) 286,201. 2. The town, on the Steinach 50 miles east of Zürich, is the see of a bishop. Until 1846 the cathedral was the abbey church of the ancient Benedictine abbey, suppressed in the 18th century. The abbey library contains some of the oldest and most precious manuscripts in the world, as well as many early printed books. One of the principal industrial towns of Switzerland, Saint Gallen manufactures linen, woolen, and cotton goods, laces, embroideries, and fine muslins. Pop. (1941) 62,530.

SAINT-GAUDENS, sânt-gô'dĕnz, **Augustus,** American sculptor: b. Dublin, Ireland, March 1, 1848; d. Cornish, N. H., Aug. 3, 1907. He was brought to the United States in infancy. At 13 he was bound in apprenticeship to learn cameo-cutting, and he spent several years at this art. Six years later (1867) he went to Paris and studied under the sculptor François Jouffroy at the École des Beaux Arts. While at Rome in 1871 he produced his first figure, *Hiawatha,* and the following year he returned to the United States. He had a studio in New York City until 1885, and thereafter at Cornish, N. H. Saint-Gaudens was a sculptor of originality and freshness, who had adopted the best standards of French taste and method of execution without being hidebound by tradition. He had a style at once polished and free. Among his other works are the *President Lincoln* statue in Lincoln Park, Chicago, Ill.; the bas-relief *Adoration of the Cross by Angels;* the *Shaw Monument* at Boston, Mass.; and the *Diana* on the tower of the old Madison Square Garden, New York City. He also took part in executing the *Parnell Memorial* monument in 1901, designed several medals of presentation authorized by Congress, and assisted John La Farge in decorating Trinity Church, Boston.

What perhaps is the most striking characteristic of all his ideal statues is *The Puritan* (at Springfield, Mass.). It represents the Puritan of earlier New England in all his aggressive and unbending strength—soldier, theologian, statesman. There is nothing winning or conciliating in his air. He is come to conquer the wilderness as Cromwell conquered the aristocracy of England and wiped out for the brief period of the commonwealth the haughtiest of European dynasties. The Puritan, as Saint-Gaudens has portrayed him, carries the Bible next his heart in one hand and a stout cudgel of oak in the other. He personifies those unswerving, and sometimes fanatic principles on which the ancient commonwealths of New England were established. The *Sherman* equestrian statue which was unveiled at the southeast entrance of Central Park in 1904 was the last of a series of five in which he commemorated heroes of the American Civil War, among the most notable of which is the remarkable statue of *Farragut* in Madison Square, New York City. Of the *Sherman* monument, executed by Saint-Gaudens, a critic had said: "The composition of the Sherman is his own, and it has the spontaneity and the balance of a work evolved straight from a powerful imagination and an original mind. The Victory is exactly where it belongs, and bears a relation as true, as unforced, as anything in nature itself to the horseman pressing close upon its flying robe. Once more a word on the sculptor's discretion is inevitable. He wanted to express movement in this monument, to give to Victory almost aerial lightness in her carriage, to embody in the horse a type of great strength, pushing its way to the front, and to make Sherman himself the very ideal of a leader, who spurns the miles behind him. The bronze seems almost sentient. The group quivers with vitality. But the rhythm of this dramatic conception is held so well in hand, it is so majestic, that classic art itself could not produce a more nobly monumental effect."

SAINT GEORGE, Cape, is the western projection of Newfoundland. It forms the northwestern extremity of Saint George Bay, on the Gulf of Saint Lawrence.

SAINT GEORGE AND THE DRAGON. See Dragon.

SAINT GEORGE'S CHANNEL, an arm of the Atlantic which separates Ireland from Wales. At the north it unites with the Irish Sea. Its entire length, from southwest to northeast, is about 100 miles.

SAINT GEORGE'S CHAPEL, Windsor, England. See Windsor.

SAINT-GERMAIN, săn-zhĕr-măn', **Comte de,** adventurer in Paris: d. Eckernfoerde, Schleswig, about 1784. Of disputed origin, he was thought to be an Alsatian Jew, a Portuguese, or the natural son of the queen of Charles II of Spain. He appeared at the French court about 1748, where he became a favorite of the marquise de Pompadour and of Louis XV. The latter employed him on various confidential missions. He claimed extraordinary powers of alchemy, and declared that he had lived 2,000 years. Arousing hostility in some quarters in Paris, he lived in London during 1760–1762, thence going to Saint Petersburg, Russia. He was again in Paris from 1770 to 1774, and then moved to Schleswig, there engaging in magical practices with the landgrave Karl of Hesse. Consult Lang, Andrew, *Historical Mysteries* (London 1904).

SAINT-GERMAIN, Treaty of, arising out of World War I, was signed on Sept. 10, 1919, between the Allies and Austria. It was the complement of the Treaty of Versailles, and settled at that period the territorial and political status of Austria. Its complete text was handed to the Austrian delegates on July 20, and it was ratified by the Austrian legislature on October 17.

It recognized Austria as a republic and fixed new boundaries for the state. Austria, on her part, recognized the full independence of all the territories which formed part of the former Russian Empire; and accepted definitely the annulment of the Brest-Litovsk Treaty, and of all treaties and agreements of all kinds concluded since the revolution of October 1917 with all governments or political groups on territory of the former Russian Empire. Austria further agreed to respect the political, racial, and religious rights of all peoples within her boundaries. The Austrian Army was limited to 30,000 men, including officers and depot troops; all Austrian warships had to be surrendered to the Allied powers, and no naval forces or air forces were allowed to be retained.

Other clauses provided for the restoration of jewels and paintings carried off by the house of Habsburg and other dynasties from Italy, Belgium, Poland, and Czechoslovakia; and her war debt was to be apportioned among the states as they existed after the dismemberment of the Austro-Hungarian Empire. Important conditions were drawn up affecting her ports, waterways, and railways.

SAINT GERMAIN-EN-LAYE, France, a town in the department of Seine-et-Oise, on a height bordering the Seine, 13 miles west of Paris. At the edge of a forest, 200 feet above the river, the air is bracing and salubrious. It is a favorite summer resort and

residence of Parisians. The terrace of St. Germain is one of the finest promenades in Europe and commands an extensive view of the valley of the Seine and surrounding hills. The ancient castle of the town now serves as a museum of antiquities; it was destroyed and restored at various epochs. This castle was first built by Charles V (1370), on the site of a still older structure, and reconstructed and embellished by many succeeding sovereigns, especially Louis XIV. Here were born Charles IX, Margaret of Navarre, Henry II and Louis XIV. James II of England and most of his family here lived and died as exiles. In the Henry IV pavilion Thiers died (1877). St. Germain is the seat of one of the cavalry garrisons which surround Paris. The treaty between the Allied and Associated Powers and Austria was signed here on Sept. 10, 1919.

SAINT GOTTHARD, sānt gŏt'ĕrd, Switzerland, a mountain group on the confines of the cantons Uri, Grisons, Ticino, and Valais, belonging to the Lepontine or Helvetian Alps, which it connects with the Bernese Alps. It forms a kind of central nucleus in the great watershed of Europe; each of its slopes giving rise to an important river—the north to the Reuss, the south to the Ticino, the west to the Rhone, and the east to the Rhine. All these rivers rise within a circuit of 10 miles from its center. The culminating point, Pizzo Rotondo, has a height of 10,490 feet, and three other summits are beyond the limit of perpetual snow. The Col of St. Gotthard, at its summit level, where the Hospice stands, is 6,808 feet high. A bridle path through the pass had existed since the 6th century and over it an excellent carriage road was completed in 1832, in which, particularly on the Italian side, formidable difficulties were surmounted, and much engineering skill displayed.

A railway tunnel pierces this mountain group between Göschenen on the north and Airolo on the south, thus directly connecting the railway system of North Italy with those of Switzerland and Western and Central Germany. This tunnel is 16,295 yards, or rather more than 9¼ miles long. Only two tunnels are longer. Its construction, begun in 1872, was completed in 1881, and it was opened for traffic early in 1882. The total cost of the railway and tunnel was about $57,800,000, of which $11,500,000 was expended on the tunnel alone, the expenses being met by Swiss, German, and Italian state subventions, by mortgages and shares. The excavation was carried on simultaneously from the Italian and the Swiss side, the workmen finally meeting in the middle, where the height above sea level is 3,785 feet.

SAINT GREGORY. See Gregory, Saint.

SAINT HELENA, sānt'l-ē'nà; sānt hĕ-lē'nà, city, California, in Napa County, in Napa River valley; altitude 299 feet; 68 miles north of San Francisco; on the Southern Pacific Railroad. St. Helena is in a fertile wine grape section, and has an important dry wine industry. The city is sometimes referred to as the "Table Wine Center of the World." Other crops are prunes, olives, figs, apricots, pears, peaches, and walnuts. Nearby, at Angwin, is Pacific Union College and the St. Helena Sanitorium (both Seventh Day Adventist). On the slopes of 4,343-foot Mount St. Helena is a petrified forest. Visitors are attracted by the vast stone vaults of the wineries, hollowed out of the solid limestone of the hills; and by the annual new-wine festivals, lavish California adaptations of an Old World custom.

St. Helena was once a part of the Carne Humana Rancho, a Mexican grant owned by Dr. Edward Bale, an Englishman, who built the Bale Mill in 1846. This mill is visited by thousands of tourists every year. Settlers came from Missouri in 1848, and the city was laid out by J. H. Still, another Englishman, in 1853. Its name comes from Mount St. Helena, which was named by early Russian settlers on the Coast. St. Helena was incorporated in 1876, and reincorporated in 1889. Pop. (1950) 2,297.

SAINT HELENA, island, in South Atlantic Ocean, a British insular possession, 1,200 miles west of Africa, and 700 miles southeast of Ascension Island, the nearest land; area about 47 square miles, of which some 8,600 acres are tillable.

St. Helena is of volcanic origin, the craters of long extinct volcanoes forming the main ridge of the island and other elevations, the highest of which is the 2,704-foot Diana's Peak. High cliffs extend around the shore to the water's edge; there are numerous caves and gorges, many of the latter 1,000 feet deep; an abundance of fresh water; and the largest tracts of level land, Deadwood and Longwood plains, in the northeastern section, are 1,700 feet above sea level. There is but one good harbor, St. James's Bay, which serves Jamestown, the only town on the island.

St. Helena's flora and fauna are interesting, many specimens being peculiar to the island; and the vegetation is largely tropical, though many English varieties have been naturalized, including the oak. Date palms, figs, fruit trees, bananas, eucalyptus, pine, cedar, bamboo and castor-oil plants thrive; potatoes and garden vegetables, cattle, sheep and poultry are raised for domestic use; and seafood and gamefowl are plentiful. Exports are chiefly flax products, tow, fiber, twine and rope. Other industries are lace making and fish curing.

St. Helena is a crown colony; and is garrisoned by a detachment of Royal Marines. There are cable connections with Capetown and the West Indies. Once an important port of call on the route to Capetown, the introduction of steam and opening of the Suez Canal changed its status, so that there is now an average of less than one vessel a week calling at the island. St. Helena was discovered in 1592 by the Portuguese, who later abandoned it; was occupied by the Dutch in 1651–1656; and by the British after 1656 except for a brief period in 1673 when it was claimed by the Dutch. Famous chiefly as the place of Napoleon's residence in exile from October 1815 until his death in May 1821, it has also been used as a place of detention for various African rulers; for Boer prisoners in 1899–1902; and World War I prisoners in 1914–1918. Ascension Island was annexed to it in 1922, and the Tristan da Cunha Islands in 1938. Pop. (1946) 4,748.

SAINT HELENS, sānt hĕl'ĕnz, county borough, England, Lancashire, 11 miles northeast of Liverpool, a municipal county and parliamentary borough, and market town. A town hall (1875–1876), a technical institute (1896), churches, schools, library and baths, an asylum and hospitals, numerous parks and recreation grounds are the main features. The town owes its importance to the coal-beds in the environs, copper-

smelting, the manufacture of iron and steel, chemical and lead works, potteries, breweries, its glass works and various other industries. Pop. (1951) 110,276.

SAINT HELENS, city, Oregon, on the Columbia River, altitude 30 feet above sea level, 30 miles from the city of Portland. It is served by the Spokane, Portland, and Seattle Railway and federal and state highways.

It is a manufacturing community with lumber, paper, and insulating-board mills. It is also a busy trading center for the vast agricultural hinterland of the Columbia River valley.

There are two grade schools, one high school, a public library, two banks, two newspapers, and numerous churches and civic organizations.

The first settlement was in 1844 but the area was not surveyed for a townsite until 1845. The city was incorporated in 1889. The government is the elected city council and mayor system. Pop. (1950) 4,711.

SAINT HELENS, a volcanic peak of the Cascade Range, in the State of Washington; height, 9,671 feet. The volcanic débris at the base and beyond is of ancient origin; the mountain has all the appearance of an extinct volcano. It resembles Mount Rainier in its treeless sides and ice-covered summit, but it is smaller. On the north side, at the base, is Spirit Lake.

SAINT HELIER, sânt hĕl'yĕr, town and civil parish, Channel Islands, island of Jersey, and a favorite European summer resort, on the east side of St. Aubin's Bay, on the south coast. It is strongly fortified and defended by Elizabeth Castle (1551–1586), on a rocky island connected with the mainland by a causeway, and by Fort Regent, an imposing citadel dominating the town. The principal buildings are Victoria College, the Maison St. Louis or Jesuit College, the courthouse, public library, town hall, hospital, Norman parish church and the French Roman Catholic cathedral. Fine markets, an esplanade and marine drive four miles long encircling the bay, and extensive and well-built harbors are prominent features. Pop. (1945) 19,398.

SAINT HENRI, city, Province of Quebec, Canada, a suburb of Montreal. It is a busy industrial center on the Lachine Canal and is served by the Canadian National Railway. Pop. (1951) 583.

SAINT-HILAIRE, săn-tē-lâr', **Auguste de** (in full Augustin François César Prouvençal de Saint-Hilaire), French naturalist and traveler: b. Orléans, Oct. 4, 1779; d. there, Sept. 30, 1853. A botanical expert, he set out in 1816 on a long journey through Brazil, carrying his explorations to regions then unknown, and returning in 1822 with valuable collections. In 1830 he was admitted to the Paris Academy of Sciences; subsequently he was made professor of botany in the Faculty of Sciences at Paris. He made several discoveries of scientific value, and published three narratives of travel, *Voyage dans les provinces de Rio de Janeiro et Minas Gerães* (1830); *Voyage dans le district des diamants et sur le littoral du Brésil* (1833); *Voyage aux sources de San Francisco et dans la province de Goyaz* (1847–1848); besides *Flora Brasiliae Meridionalis* and *Leçons de Botanique* (1840–1841).

SAINT-HILAIRE, Marco de (real name Emile Marc Hilaire), French writer: b. Versailles, about 1796; d. Dec. 5, 1887. He was educated as a page at the court of Napoleon I, and finding himself without means of support after the Restoration, turned his attention to literature. Though not important as a writer, his constant glorification of Napoleon was popular and undoubtedly did much to pave the way for the Second Empire. His work includes *Mémoires d'un page de la cour impériale* (1830); *Souvenirs de la vie privée de Napoléon* (1838); *Souvenirs intimes du temps de l'Empire,* 6 vols. (1838–1846); and *Histoire de Napoleon III* (1853).

SAINT HUBERT, Order of. See Orders and Decorations—*Germany* (Bavaria).

SAINT HYACINTHE, town, Quebec, Canada, in St. Hyacinthe County, on the Yamaska River, about 35 miles east of Montreal via the Canadian National (main line Montreal to Portland) and the Canadian Pacific railways. It is in a rich dairying and mixed farming district. The present-day city is chiefly noted for its industries the largest of which is a manufactory of cotton yarns. Other companies produce artificial silk, knitted goods and hosiery, and woollen yarns, and men's factory clothing.

The city was incorporated as a town over a hundred years ago. There is a Roman Catholic cathedral, a Dominican College, a seminary, a technical school, and two convents. Pop. (1951) 19,999.

SAINT IGNATIUS COLLEGE, now **LOYOLA UNIVERSITY.** See Loyola University.

SAINT IVES, sânt īvz', municipal borough, England, in Cornwall on St. Ives Bay, 60 miles southwest of Plymouth. The parish church of St. Andrew is in the Early Perpendicular style of the 15th century. It is a fishing town and popular watering place. Pop. (1951) 9,037.

SAINT IVES, municipal borough, England, in Huntingdonshire, on the Ouse River, about 50 miles north of London. It is the seat of an annual fair and market which was granted by Henry I to the abbot of Ramsey in 1286. This fair, originally held for eight days at Easter time, was gradually extended for a few days, and still survives. An old bridge, built by the abbots in the 15th century, crosses the river here. The central part of the bridge was used as a chapel. Oliver Cromwell was said to have resided here for one year, 1634–1635. The town, incorporated in 1874, has a large agricultural trade. Pop. (1951) 3,077.

SAINT JAMES, city, Minnesota, county seat of Watonwan County, on St. James Lake, 33 miles west-southwest of Mankato and 120 miles southwest of Minneapolis and St. Paul. It is served by the Chicago, St. Paul, Minneapolis and Ohio, and the Minneapolis and St. Paul railroads. It is an important agricultural area. Settled in 1868, it was incorporated in 1900. The form of government is city council. Pop. (1950) 3,861.

SAINT JAMES'S COFFEE-HOUSE, a famous Whig coffee-house of London which flourished from the time of Queen Anne until

late in the reign of George III. It stood on Saint James' street in the neighborhood of Saint James' Palace, and was much frequented by Swift, Harley and other men of note in its early days. It was here that Goldsmith's poem *Retaliation* originated.

SAINT JAMES'S PALACE, London, England, a royal palace located on the Mall, between St. James's and Green parks. It was originally the site of a hospital built about the time of the Norman Conquest, but Henry VIII took possession of it in exchange for land in Suffolk. During 1532–1533 he had it rebuilt as a palace. Edward VI, Elizabeth, and Mary I lived here; it was the birthplace of Charles II, James II, Mary II, Anne, and George IV. Queen Mary I died here in 1558, and in 1649, Charles I spent his last night here. Queen Caroline, wife of George II, died here. George III acquired Buckingham Palace and often lived there. The palace is also remembered as the scene of many famous weddings: George III to Charlotte; George IV to Caroline of Brunswick; Queen Victoria to Prince Albert; Edward VII to Princess Alexandra; and George V to Princess Victoria Mary of Teck. Sir Christopher Wren was married here to his second wife, Jane Fitzwilliam, in 1676. Fire destroyed the east wing of the palace in 1809. Buckingham Palace became the royal home with the accession of Queen Victoria. It was considerably damaged by bombings and fires during World War II, and several rooms were destroyed.

SAINT JEAN D'ACRE, săn zhŏn däkr, Palestine. See ACRE.

SAINT-JEROME, Canada, city and county seat of Terrebonne County, Quebec, 29 miles north of Montreal, on the North River, and on the Canadian Pacific and the Canadian National railways. It is the seat of a commercial college, a normal school, and a convent. Its industries include rubber mills, knitting mills, foundries, paper mills, cement pipes, pulp, and sash and door and saw mills. Pop. 12,000.

SAINT JEROME DE MATANE, or MATANE. See MATANE.

SAINT JOHN, one of the 12 apostles of Jesus Christ. He and his brother James are often spoken of as sons of Zebedee. It is commonly accepted (cf. Mark xv, 40 and Matt. xxvii, 56) that his mother's name was Salome and it is still further conjectured by many (see John xix, 25) that she was a sister of Mary, the mother of Jesus — a relation which would render more natural the committing by Jesus of his mother to the care of John. The family seems to have possessed some means, as Zebedee employed hired servants in his fishing business; Salome is mentioned among the pious women who aided in the support of Jesus and his associates during his ministry and John himself was personally known to the high priest.

Of his early life we know nothing. Presumably he had the ordinary training of the Jewish boy of his time and no more. In the order of narration, he first appears, according to an obvious inference, as an unnamed disciple of John the Baptist, who with Andrew follows Jesus (John i, 35–39). After some association with Jesus, John returned to his occupation as a fisherman, from which Jesus summoned him and his brother, together with Simon and Andrew, to discipleship, which was the basis of his appointment as one of the 12 apostles. In this company he was one of the three who were admitted to the closest intimacy with their Master and, indeed, is generally understood to be "the disciple whom Jesus loved." Little in particular is noted, however, in reference to him while Jesus lived. He and his brother are said to have been called "Boanerges," defined as "Sons of Thunder" (Mark iii, 17). While the meaning is somewhat obscure, it seems most probable that this hints at great stores of emotional power and passion. He, with his brother, is rebuked for proposing to summon fire from heaven to destroy the inhospitable Samaritan village, and he alone confesses attempting to check the activity of a healer who was not of their company. Only he of the apostolic company is mentioned as present at the trial of his Master and at his crucifixion, where he received the commission to care for Mary, the mother of Jesus, which he faithfully carried out, making a home for her till her death.

It appears from the statements in Acts and of Paul in his Epistle to the Galatians that for some time John remained in Jerusalem. Beyond this we are dependent upon tradition, which consistently associated the latest years of his life with the city of Ephesus. To be sure, on the basis of uncertain inferences from an obscure passage possibly incorrectly quoted by Eusebius from Papias, it has been argued by many scholars that all the tradition that John was at Ephesus was due to the confusion of the apostle with a supposed presbyter and original disciple of Jesus bearing the same name. But all the positive evidence tends toward the association of John in his latest years with Ephesus. There is a fragmentary tradition that he went to Rome and was there plunged into a cauldron of boiling oil, from which he miraculously escaped unharmed, and that he was then banished to an island. John, the author of the Apocalypse, speaks of himself as being "in the isle that is called Patmos," and the date which is given by Irenæus and others for the exile of John the apostle is late in the reign of Domitian, and for his return the year 96, early in the reign of Nerva. There is no tradition as to the date of his death. Many legends are current as to his life at Ephesus. Irenæus tells of his hostility to the tenets of the Gnostic Cerinthus, such that John even refused to remain under the same roof with the heretic. Clement of Alexandria exalts his pastoral fidelity by a story how he journeyed into the forest to reclaim a young man who had fallen into evil ways and joined a band of robbers. Cassian relates that when he was censured for spending time in play with a tame partridge, he answered that the bow cannot always be bent. The story, however, which is most familiar, is due to Jerome, who tells that, when so aged that he must be carried into church and was unable to speak at any length John would continually repeat, "Little children, love one another." Perhaps partly based on this story, partly perhaps on an impression gained from a superficial reading of his letters, the notion has widely prevailed that John was a weak sentimentalist. But this is unjust. It has been profoundly said of his epistles that their words are thunderpeals and it is plain that in his soul burned the fires of passion and

power which made him in his youth one of the «Sons of Thunder,» although in his age he had learned repression and self-mastery.

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Former Professor of New Testament Interpretation, Colgate University.

ST. JOHN, Charles Edward, American physicist: b. Allen, Mich., 15 March 1857. He was graduated at the Michigan Normal College in 1876 and studied physics at Harvard and at the University of Berlin. He became instructor of physics at Michigan Normal College in 1885; was made associate professor at Oberlin College in 1897 and in 1899 became professor of physics and astronomy at that institution. In 1907 he was appointed dean of the College of Arts and Sciences there. From 1908 he has been astronomer at the Mount Wilson Solar Observatory of Carnegie Institution. He is a member of various national astronomical societies. He has written 'Wave-Lengths of Electricity on Iron Wires' (1894); 'A Study of Silphium Perfoliatum and Dipsacus Laciniatus in Regard to Insects' (1887).

ST. JOHN, Frederick Edward Molyneux, Canadian journalist and author: b. Newcastle, England, 28 Nov. 1838. His father was one of Wellington's veterans at the battle of Waterloo and the son followed him in a military career, on 23 April 1855 entering the Royal Marines (Light Infantry) as second lieutenant. He served under General Van Straubenzie throughout the operations against Canton in 1857–58 and acted with such gallantry under fire during the storming of the fort that in August 1858 he was promoted first lieutenant. In 1868 he came to Canada and being a member of the staff of the Toronto *Globe* was appointed in 1870 to accompany Colonel Wolseley's Red River expedition and later served with Lord Dufferin on his tour of British Columbia. Upon the forming of the Northwest Territories, he became the first clerk of the legislature, the first secretary of the Protestant board of education and later was appointed sheriff and Indian commissioner. In 1879 he returned to England, where in 1884 he became the first emigration agent and London secretary to the Canadian Pacific Railway. He was at different times editor of the Winnipeg *Standard*, the Montreal *Herald* and the Manitoba *Free Press* and in 1888 was president of the Ottawa Press Gallery. He has published 'A Sea of Mountains,' an account of Lord Dufferin's tour (1877); and 'Under the Mistletoe,' a society play. Deceased.

ST. JOHN, Henry. See BOLINGBROKE, VISCOUNT.

ST. JOHN, James Augustus, English author and traveler: b. Carmarthenshire, Wales, 24 Sept. 1801; d. London, 22 Sept. 1875. At 16 he went to London and engaged in newspaper work and in 1827 started the *Weekly Review*. He lived much of his life abroad, in France Switzerland, Egypt and elsewhere and found material in his travels for many of his works. He contributed to 'Constable's Miscellany' in 1830 a 'Journal of a Residence in Normandy' and wrote 'Egypt and Mohammed Ali' (1834); 'Anatomy of Society' (1831); 'Manners and Customs of Ancient Greece' (1842); 'Egypt and Nubia' (1845); 'Views in the Eastern Archipelago' (1847); 'Isis, an Egyptian Pilgrimage' (1853); 'Philosophy at the Foot of the Cross' (1854); 'Nemesis of Power' (1854); 'Preaching of Christ' (1856). He also wrote 'Lives of Celebrated Travelers' (1831); a biography of 'Louis Napoleon' (1857); an elaborate 'Life of Sir Walter Raleigh' (1868–69), etc.

ST. JOHN, John Pierce, American governor and prohibitionist: b. Brookville, Ind., 25 Feb. 1833; d. Olathe, Kan., 31 Aug. 1916. He went to California in 1853; later traveled in Mexico, Central and South America and Hawaii; and fought in Indian wars in Oregon. He served in the Union Army in 1862–65, attaining rank of lieutenant-colonel and subsequently removed to Missouri, where he engaged in law practice. In 1869 he settled at Olathe, Kan., and in 1879–83 he was governor of Kansas. He was Prohibition candidate for President in 1884, but in the first Bryan campaign affiliated himself with the Democratic party. He toured Kansas for woman suffrage in 1912 and in 1914 went on a speech-making tour of the East in behalf of prohibition.

ST. JOHN, Sir Spencer, English diplomat, son of J. A. St. John (q.v.): b. London, 22 Dec. 1825; d. Camberley, Surrey, 2 Jan. 1910. In 1848 he was appointed secretary to Sir James Brooke in Borneo, in 1850 became secretary to the mission to Siam and during 1856–61 was consul-general in Borneo. During the years 1863–96 he was consul successsively in Haiti, Lima, Bolivia, Mexico and Stockholm. He was created K. C. M. G. in 1881. He has published 'Life in the Forests of the Far East' (1862); 'Life of Sir James Brooke, Rajah of Sarawak' (1878); 'Haiti, or the Black Republic' (1885); 'Rajah Brooke, (1899); 'Adventures of a Naval Officer' (1905); 'Earlier Adventures' (1906); 'Essays on Shakespeare and his Works' (1908).

SAINT JOHN, one of the Virgin Islands, formerly Danish West Indies, lying east of Saint Thomas (q.v.), area, 19 square miles. It is of volcanic origin and hilly; only a small portion of the land is cultivated; sugar is the chief agricultural product. Cattle are raised and exported and bay rum is also exported. Coral Bay, on the east coast, is one of the best sheltered and safest harbors of refuge during hurricanes in the Antilles. By the terms of a treaty with the United States, ratified by the Danish parliament 22 Dec. 1916, the entire Danish West Indies, for and in consideration of the sum of $10,000,000, passed into the possession of the United States and are now administered by it. Pop. (1940) 722. See WEST INDIA and VIRGIN ISLANDS.

SAINT JOHN, British West Indies, the capital of Antigua, situated on the northwest coast, stands at the head of a safe but small bay. The residence of the English governor-

in-chief is the principal building. The staple of the island is sugar, which, together with pineapples, forms the chief export trade.

SAINT JOHN, city, Province of New Brunswick, Canada, St. John County seat; situated at the mouth of the St. John River on the Bay of Fundy; terminal of both the Canadian National and Canadian Pacific railways; by rail 482 miles from Montreal, 279 miles from Halifax. The city has a municipal airport with airline service, and is one of the great winter ports of Canada's Atlantic seaboard, administered by the National Harbours Board, and linked with every continent by steamship services.

Economic Activity.—St. John has nearly three miles of modern concrete piers, a score of metal transit sheds, three grain elevators with a storage capacity of 3,500,000 bushels, new customs and immigration facilities, and a drydock that could easily hold any ocean liner; a graving dock 1,150 feet long, 125 feet wide, and 42 feet draft over sill; and a tidal dock 440 feet long, 60 feet wide. The drydock and shipping are St. John's largest industries. Others include lumbering, woodworking, sugar refining, brass foundry, brushes, commercial fishing, clay bricks and building tiles, roofing, nails, cardboard and corrugated boxes, textiles, molasses, and lime.

Education.—Educational and cultural interests are strongly represented, including a symphony orchestra, art association with representative Canadian artists, music, and drama groups. A large provincial Festival of Music is held in St. John each spring.

Buildings and Places of Public Interest.—Besides modern public schools, a provincial vocational school, New Brunswick Museum, and Public Library, there are 67 churches (one erected in 1824), and four hospitals (including one provincial and one dominion institution). About a mile from the center of St. John are the Reversing Falls rapids seen where the St. John River meets the sea at the head of St. John harbor. At low tide the river water rushes through a 325 foot gorge with banks 95 feet high and makes a 17 foot descent to the sea. Then for a few minutes at slack tide, half way between high and low tide, the seething cauldron is quiet as a mill pond, and ships may pass through the gorge. Later, with the rising tide, the ocean waters force themselves upstream through the chasm in a turmoil of boiling eddies, whirlpools and rapids. This struggle takes place twice in every 24 hours.

History.—The river owes its name to Samuel de Champlain and Sieur de Monts, who first visited the harbor on the day of St. John Baptiste, June 24, 1604. For some years following Father Edmond Mosse, a Jesuit, was reported living among the Indian savages but it was not until 1631 that Ft. La Tour was built at St. John, only to be destroyed by Sieur D'Aulnay de Charnisay who established himself in another fort on the opposite side of the harbor. Ft. Charnisay was occupied by garrisons from time to time until 1700 when it was allowed to fall into ruin for about half a century. About the year 1758, however, it was captured by the English, rebuilt, and named Ft. Frederick. In 1762 the first English settlement developed under James Simonds, William Hazen and James White whose interests lay in fisheries, fur, ships, lumbering and lime. Finally the modern city developed in 1783 with the arrival of the United Empire Loyalists. This wave of colonization made New Brunswick a province in 1784, and a Royal Charter effective May 18, 1785, incorporated the former settlements of Parrtown and Carleton as the city of St. John, the first incorporated city in British America. St. John was also the first city in Canada to adopt the commission form of government. In 1877 a disastrous fire destroyed over half the city and many of the old wooden buildings were replaced with brick. Pop. (1951) 78,337.

PATRICIA W. HART,
Chief Librarian.

SAINT JOHN, river, the largest river of the province of New Brunswick, Canada, has its source in the highlands of northern Maine. After a course of 390 miles, it empties into the Bay of Fundy through a rocky gorge 325 feet wide, having a total fall of 17 feet. Throughout most of its upper course it forms the boundary between Maine and Canada. It is navigable for steamers of considerable size as far as Fredericton, a distance of 86 miles, while small steamers ascend to Woodstock, 145 miles.

SAINT JOHN, Knights Hospitallers of. See JOHN, ORDER OF SAINT.

SAINT JOHN, Lake (French LAC SAINT-JEAN), Province of Quebec, in St. John County, Canada, 200 miles by rail north of Quebec, a circular body of water, about 28 miles long and 25 miles broad, drained by the Saguenay River (q.v.). It receives the waters of the Mistassini, the Peribonka, the Ashuapmuchuan, and several smaller streams. It is exceedingly popular for its fishing.

SAINT JOHNS, city, Michigan, and Clinton County seat; altitude 765 feet; 98 miles northwest of Detroit; on the Grand Trunk Railway; federal highways; and with motorbus and truckline service. Situated in a rolling, well watered district, it has varied farming interests, including livestock, beans, peppermint and hatcheries; while among its manufactures are farm implement parts, piston rings, spray guns, and foundry products. There is a public library, and the village has a mayor, council and city manager. There are three elementary schools and one public high school. The water works are municipally owned. Pop. (1940) 4,422; (1950) 4,948.

SAINT JOHN'S, city, capital of the Province of Newfoundland, Canada, situated in the southeast corner of the island, in latitude 47° 34′ 02″ N, and longitude 52° 40′ 59″ W. It lies across the chief Atlantic shipping lanes and is 1,213 miles from New York and 1,829 miles from Liverpool. The harbor is completely landlocked and is entered by a short passage between high cliffs known as the "Narrows." The town was originally situated on the north side of the harbor but in recent years has spread north and west. It was a convenient port for fishing craft from European nations in the 16th century and today is a key defense port of the North Atlantic.

Communications.—St. John's is the eastern terminus of the Newfoundland Railway which on confederation in 1949 became part of the Canadian National Railway system. The western terminus at Port-aux-Basques is connected by boat with the mainland of Canada. Steamship lines also connect the city with Liverpool, New York, Bos-

ton, Halifax and Montreal. St. John's is also on the international air routes being only 45 minutes flying time from the Gander Airport. Its airport, Torbay, is four miles from the city. The city is connected by cable and telegraph lines and by radio telephone with the mainland of North America and the continent of Europe. It will be the eastern terminus of the Trans-Canada Highway, when completed. Communication is maintained with all parts of the province by means of telegraph, telephone and radio telephone. Steamships of the Newfoundland Railway ply between the capital and the chief ports along the coast. Transportation within the city is by bus and taxi and bus lines connect it with nearby towns and villages.

Business Center.—St. John's is the chief center of the business and financial interests of the island. In recent years, however, it has lost some of its importance in this respect. This is due to the development of the paper industry and the consequent rise to importance of the paper towns of Grand Falls in the north and Corner Brook in the west and also to the partial decentralization of the fishing business. Nevertheless it still retains much of its character as a center of the shipping and commercial interests and is still the chief center of the fishing business including the seal fishery. It also serves as a distributing center for the greater part of the island with the exception of the west coast. There are five banks: Bank of Montreal, Bank of Nova Scotia, the Royal Bank of Canada, the Bank of Commerce and the Newfoundland Savings Bank. Most of the principal business houses are located here. It has a large dry dock.

Manufactures.—There are several important factories, one of the largest being a ropewalk. There are biscuit factories, a margarine factory, breweries, lumber factories, foundries, a paint factory and a tobacco factory. There are two large fish refrigeration plants. Seal and cod oil are manufactured and seal skins exported.

Public Works, Buildings.—The city has an excellent water service, the water being obtained from a natural lake a few miles distant. Hydroelectric power is furnished by plants a few miles from the city. The city is the headquarters for the health services of the province and has three large hospitals, a mental hospital and a sanatorium for tubercular patients. It has two cathedrals, the one, Roman Catholic, an imposing example of modified Romanesque architecture, and the other, Anglican, a beautiful example of Gothic, designed by the late Sir George Gilbert Scott, R.A. There are also a number of fine churches of the various religious denominations. The city possesses a number of excellent schools and colleges and also a public library. There is now a university—the Memorial University—formerly known as the Memorial University College. It was built as a memorial to the Newfoundlanders who fell in the war of 1914–1918, and was given the status of a university in 1950. There is also a fine monument erected to commemorate the fallen in the same war. Other public buildings are the Colonial Building where the legislature meets, Government House and the Court House. The city has three radio stations and is the regional headquarters for the Canadian Broadcasting Corporation. It has three parks—Bannerman, Victoria, and Bowring. The latter is situated about two miles from the city and is noted for its beautiful natural scenery.

History.—Because of its position in the center of the cod-fishing grounds, St. John's became the headquarters of the fishing industry from the date of the discovery of Newfoundland in 1497. The date of its foundation cannot be exactly determined. Its first inhabitants were evidently part of the crews of the fishing fleet, who were left behind during the winter to prepare for the next season's fishery. There were 20 houses in St. John's in 1540. Hayes, a member of Gilbert's expedition in 1583, speaks of the town as a "place very populous and much frequented." A large barter trade, one of the most important in Tudor times, was carried on here between the French, Portuguese, Basques and the English fishermen. The American colonies began trading with Newfoundland as early as 1641 and by the time of the revolution St. John's did a business of $4,000,000 with them.

The town was twice captured and destroyed by the French and their Indian allies. On the last occasion it was retaken by Col. William Amherst with the Highlanders and the Royal American Regiment, the last and most gallant fight of the Seven Years' War.

St. John's was built of wood and has been three times practically destroyed by fire, in 1817, 1846, and 1892. It has been greatly improved in recent years and most of the buildings are now of brick, stone and concrete.

It has been the scene of a number of historic events. It was here that Sir Humphrey Gilbert took possession of the island in 1583. In 1901 Signor Guglielmo Marconi received here the first wireless signal to be sent across the Atlantic. In 1939 King George VI and Queen Elizabeth visited it. In 1919 Alcock and Brown took off from here on the first successful trans-Atlantic flight. The American base, Fort Pepperell was established near the city in 1941.

Government and Population.—The city is governed by a mayor and a council of six members. Pop. (1951) 67,749.

SAINT JOHNS, a river in Florida, the source of which lies in the unsurveyed swamps about Lakes Helen Blazes and Saw Grass in Brevard County. It flows north nearly parallel to the seacoast through numerous marshes, ponds, and lakes to Jacksonville where it turns eastward to enter the Atlantic Ocean about 15 miles from the city. Luxuriant vegetation, and in places large trees, line its banks for the greater part of its course. It is navigable for ocean steamers to Jacksonville, and for small steamers as far as Sanford, about 200 miles from the sea. In its lower (northern) reaches it is six or seven miles wide, and it is a mile wide 150 miles from its mouth. It forms part of the Intracoastal Waterway from Palatka, 86 miles upstream to the Atlantic Ocean. It receives many streams notably the Oklawaha. See FLORIDA—*Physical Characteristics.*

SAINT JOHN'S BREAD. See CAROB.

SAINT JOHN'S COLLEGE, Cambridge, England, was founded by Margaret, countess of Richmond and Derby, mother of King Henry VII, in 1511 mainly through the exertions of Fisher, bishop of Rochester, then chancellor of the university, who raised sufficient funds to endow 32 fellowships. The college replaced Saint John's Hospital founded in

the 12th century, and now consists of a master, at least 56 fellows, 60 foundation scholars and nine sizars; both fellowships and scholarships being open to all British subjects. Five fellowships are professorial fellowships to be held by professors of the university. There are three divinity studentships of the value of about $400, tenable for three years, and open to the competition of bachelors of arts not of sufficient standing to take the degree of M.A.; also four law studentships of the value of $450, tenable for four years; and a Hebrew scholarship of the value of $160, tenable for three years. Some $33,500 are expended annually in assisting deserving students of the college, and there are a number of prizes which are awarded on the results of the annual examinations. The college has the patronage of 52 church livings. The buildings include four courts chiefly of brick; the new court (1826) across the Cam, built of stone, is united by an ornamental covered bridge, commonly called the «bridge of sighs,» with the third court. The chapel (1869) is by Sir Gilbert Scott, and is a fine specimen of the Early Decorated style. The combination-room, 93 feet long, and the library (1623) are curious and striking. Ascham, Ben Jonson, Bentley, Rowland Hill, Wilberforce, Wordsworth and Lord Palmerston were members of the college.

SAINT JOHN'S COLLEGE, Oxford, England, a college founded in 1555 by Sir Thomas White, a London alderman, for a president, 50 fellows and scholars, a chaplain, an organist, six singing men, eight choristers and two sextons. Some of the buildings belong to the earlier college or Saint Bernard dating from about the middle of the 15th century. With buildings added at subsequent dates the whole forms a picturesque group. Under the statutes made by the Oxford Commissioners in 1926 the foundation consists of (1) an unlimited number of fellowships comprising the official fellows, professorial, emeritus, and supernumerary fellows, and senior and junior research fellows; (2) not more than 46 entrance scholars, of which 15 are for the Merchant Tailors' School, two to Coventry School, two to Bristol School, two to Reading School, one to Tunbridge School, and the remainder, not exceeding 24, open scholarships; (3) three senior scholarships confined to former pupils of Merchant Tailors' School. There are also two Fereday fellowships of £200 each annually; four Casberd scholarships of £100 annually; and certain exhibitions for undergraduates not on any foundation, and of at least one year's standing in the college. The Fereday fellowships founded by Dudley Fereday of Ettingshall Park, Stafford, are open, with certain limitations in respect to literary proficiency, first to the kindred of the founder, secondly to natives of Staffordshire, and then to any person whatsoever. There are some 33 church livings within the patronage of the college. Saint John's College, like all the other colleges at Oxford, is an individual corporation forming part of the general corporate body of the University.

SAINT JOHN'S COLLEGE, located at Annapolis, Md., was founded in 1696 as King William's School, rechartered under its present name in 1784. William Paca, Maryland signer of the Declaration of Independence, was among the petitioners for the charter. Three other signers, Charles Carroll of Carrollton, Samuel Chase, and Thomas Stone, were members of the College's Board of Visitors and Governors. Among its graduates was Francis Scott Key. The College is for men only and is non-sectarian. In 1937 St. John's drastically revised its curriculum; abolished the elective system in favor of a four-year all-required curriculum; abolished text-books for the study of some hundred-odd of the world's greatest books from Homer to living authors. This curriculum, which gained national fame as «the St. John's Program,» involved for every student four years of seminar discussions of the great books, of language study, of mathematics, of laboratory science. In 1938 the College abolished intercollegiate athletics and substituted a greatly expanded system of intra-mural sports. Approximate annual enrolment: 150.

SAINT JOHN'S EVE. See JOHN'S, EVE OF SAINT.

SAINT JOHN'S UNIVERSITY, Brooklyn, N. Y., founded as Saint John's College in 1870, chartered in 1871, re-chartered by the Regents of the University of the State of New York in 1906, and granted full university privileges with power to establish all necessary professional schools. It comprises a school of arts and sciences offering courses leading to the degrees of Bachelor of Art and Bachelor of Science; a graduate school offering courses leading to the degrees of Master of Art and Master of Science; a school of law; a school of pharmacy, and a school of commerce. It also operates a summer school. The school of arts and sciences is for men only: the graduate school and the various professional schools are open to both men and women. The university is under the control of the Roman Catholic Church. In 1935–36 there were 6,800 students enrolled.

SAINT JOHN'S UNIVERSITY, Collegeville, Minn., founded in 1857 and chartered the same year, is a Roman Catholic institution in charge of the Order of Saint Benedict. In 1869 the school was granted power to give degrees; and in 1878 it was further empowered by Leo XIII to grant the degrees of doctors in theology, philosophy and canon law. In 1883 it received from the legislature of Minnesota the title of University. The institution comprises the College Preparatory; the Liberal Arts College; the Seminary, also called School of Theology; and the School of Architecture. The university conducts week-end seminars in sociology in connection with the State organization of the Central Verein of Minnesota.

SAINT JOHN'S UNIVERSITY, Toledo, Ohio, under the direction of the Fathers of the Society of Jesus was opened in September 1898 and as «The Saint John's College of Toledo, Ohio,» was incorporated 22 May 1900. On 29 Aug. 1903 with the corporate title changed to «The Saint John's University of Toledo, Ohio,» the power to grant degrees under an amended charter, was ratified by the Secretary of State. Well equipped buildings and grounds offer all possible facilities for higher education. An undergraduate department consisted of a four years' course in the study of English composition and literature, Latin and Greek, German, French, history, algebra and the regulation courses of a Jesuit institution. The

university consisted of three distinct departments: St. John's College for Men; Mary Manse College for Women; and Teachers' College. There was for a time a law department, and there was no graduate school strictly speaking, though special students might enroll for the master's degree. The regular degrees offered were the B.A., the B.S., and the Ph.B. A two-year premedical course was given. The annual approximate enrollment in all departments was about 500. The institution is now closed.

SAINT JOHN'S WORT, a large genus (*Hypericum*) of plants of the family Hypericaceae. They are to be found nearly everywhere in the temperate and torrid zones, and are often shrubs or small trees. The foliage is pellucid punctate or black-dotted and the leaves and blossoms emit, when bruised, a strong resinous-aromatic odor, and have a bitter taste, due to an oil possessing astringent and tonic properties, and which held a prominent place in old pharmacopoeias. The flowers are perfect and numerous, borne solitary or in cymose panicles and are generally yellow.

Hypericum perforatum, to which formerly the name of St. John's wort was limited, has its leaves marked with pellucid dots, somewhat simulating perforations. It is a European plant which has become naturalized in America, and is a troublesome weed. It is a very smooth, shining herb, sometimes two feet high, with opposite oblong leaves and bright yellow flowers in broad terminal cymes. Both petals and leaves are black-dotted. Its yellow, acrid, resinous juice will stain the skin purple and was believed by Dr. John Torrey to cause inflammatory trouble in cattle. The dried plant dyed wool yellow.

Tradition states that the St. John's wort was so called because bloodlike spots appeared on its foliage immediately after the saint was beheaded and reappeared on the anniversary of the date. It was regarded as a universal panacea and perhaps possessed some curative qualities, especially in external use. It was supposed to preserve persons and property against lightning, but was still more in demand as a preventive of witch visits or those of other evil spirits, perhaps because, according to tradition, a baptized person anointing the eyes with the green juice of its inner bark could see witches. Italians gave it the name of devil-chaser. It was not only worn as an amulet, but was hung over doors and windows; yet it was not safe to tread on it after dark, since the luckless wight that bruised it might be snatched up on a fairy horse and carried about all night. St. John's wort, plucked on midsummer night's eve, took its place among the love charms.

SAINT JOHNSBURY, village, Vermont, and Caledonia County seat, situated at an altitude of 655 feet between the Green and the White Mountains at the confluence of the Passumpsic, the Moose and the Sleeper's rivers. This largest town in northeastern Vermont, 30 miles east of Barre, is served by the Canadian Pacific, the Maine Central, and the St. Johnsbury and Lake Champlain railroads and by the Vermont Transit Company busses and Greenwood Bus Lines. It has a municipal airport.

The territory was first granted by King George in 1770 under the name of Bessborough and later, Dunmore; the first settlement was in 1786, when Jonathan Arnold and associates of Rhode Island received a charter from Vermont's first governor, Thomas Chittenden. The community, still the only one in the world of its name, was named in honor of Michel Guillaume Jean de Crèvecoeur (pseud. J. Hector St. John), French consul at New York, friend of Ethan Allen and author of *Letters from an American Farmer.* In 1792, St. Johnsbury and other towns were set off from Orange County to form the new county of Caledonia. In 1856, the county seat was transferred from Danville to St. Johnsbury. In 1830 Thaddeus Fairbanks, seeking a method of weighing entire loads of hemp, invented and patented scales for this purpose.

The village is the business, industrial, shipping and cultural center of an agricultural section; claims the largest maple sugar industry in the world and, in addition, besides manufacturing scales, produces stock feeds, tool handles, dresses, gloves, chairs, bowling and billiard supplies, optical lenses and other articles. Located here is the St. Johnsbury Academy (founded in 1842 by Thaddeus Fairbanks and his brothers); the St. Johnsbury Trade School; and the Convent of the Congregation of Notre Dame. The vocational school is closely related to the scales works. There is a museum of natural science, and the Athenaeum is a well-stocked library and museum. The government is of the city manager type. Pop. (1940) 7,437; (1950) 9,281.

SAINT JOHNSVILLE, village, New York, in Montgomery County; altitude 360 feet; on the Mohawk River and the New York State Barge Canal; 64 miles northwest of Albany; on the New York Central Railroad. Its products are dresses, underwear, gloves, and shoes. It became a town in 1798, a village in 1875, and has mayor and council government. Pop. (1940) 2,283; (1950) 2,210.

SAINT JOSEPH, city, Michigan, and Berrien County seat; altitude 595 feet; on Lake Michigan, at the mouth of the Saint Joseph River; 96 miles east of Chicago; on the New York Central; Chicago, South Shore and South Bend (electric); and the Chesapeake and Ohio railroads. St. Joseph is closely related, commercially, with Benton Harbor, two miles to the north, especially in connection with lake shipping business. St. Joseph is situated on a hill west of the river and has varied industrial activities; its factories, shops, and foundries make hosiery, paper boxes, rubber goods, washing machines and ironers, and malleable metal products. Inland from the city lies the Michigan fruit belt. There are mineral springs nearby. The modern public and parochial schools and city library constitute St. Joseph's educational facilities.

An old lighthouse is a point of interest; and the accepted site of old Fort Miami, built about 1700, is marked. A French flag flew here until 1763 when Chief Pontiac pulled it down and destroyed the post. Permanent settlement was effected in 1829; incorporated as a village in 1836, and as a city in 1892. The city government is administered by commissioners and a city manager. Pop. (1940) 8,963; (1950) 10,223.

SAINT JOSEPH, city, Missouri, and county seat of Buchanan County, on the Missouri River, the third city in size and wealth in Missouri, is a major trading center for 15 counties in northwest Missouri, southwestern Iowa, southeastern

Nebraska and northeastern Kansas. The city extending for three miles along the river front stands on high rolling ground, entirely free from floods or overflow and covers an area of 14.07 miles. A modern steel free bridge permits traffic flow into the state of Kansas, Elwood, Kansas, being the port of entry. With its sightly hills, winding avenues, parks, and beautiful boulevard system, St. Joseph is a picturesque city, healthful and a desirable place of residence.

The railroads serving St. Joseph are the Santa Fe, Burlington, Rock Island, Chicago Great Western, Missouri Pacific, and Grand Island Railroad (Union Pacific System). Through their immediate connections St. Joseph is served by railroads to all points in the northwest, southwest and central west. The city has a 500-acre modern municipal airport. It has 1,350 acres of parks and parkways of natural beauty, numerous tennis courts, two municipal swimming pools, three private and one municipal golf courses. It is an important commercial center and its principal industries consist of meat packing, milling, cereal manufacturing, textiles and it is the home of the largest tablet and stationery manufacturing plant in the world; and has many beverage manufacturing companies.

Predominating Industries.—The leading industrial and commercial activities of St. Joseph are manufacturing, merchandise distribution and livestock and grain marketing. The principal manufactures are packinghouse products, milling and cereal products, clothing and other textiles, candy, dairy products, harness and saddlery, foundry and machine-shop products.

Stock Yards.—A great impetus was given the growth and prosperity of the city by the improvements and extensions made at the stock yards, which were begun in the year 1897. The stock yards proper consist of approximately 500 acres of land, 80 acres of which are covered by pens and sheds. Swift & Company together with Armour & Company comprise the principal packers in the southern portion of the city, there being several smaller plants which kill and pack in other portions of the city. This industry has undergone extensive development in the past decade.

Public Buildings.—Chief of these are the Federal Court and Post Office building. Other buildings of importance are the County Courthouse, Union Railway Station, the Auditorium, Livestock Exchange, Corby Building, Chamber of Commerce Building which houses the Chamber of Commerce and the St. Joseph Forward Association which is an organization created by the leading businessmen of St. Joseph for the industrial development of St. Joseph and its environs. This association is a nonprofit organization and acts as the industrial department of the Chamber of Commerce. The city has built numerous new school buildings which rank in beauty with those of larger cities. In recent years a new city hall has been built in a civic center setting and is a building of beauty. During the year 1939 new structures replaced many obsolete buildings, among those being a new city market building, new modern telephone building, new Federal Court and Post Office Building, various new fire stations of the bungalow type, and a new Central Police Station, the latter being radio equipped for contact with squad cars and fire department in the city, also for contact with state highway patrol cars.

Other important buildings are the Junior College, new Benton and Lafayette High Schools, Central High School Building which is a structure of beauty and located near the Noyes Boulevard system, surrounded by beautiful homes, municipal swimming pool, tennis courts and has a large stadium with press facilities, together with athletic field for sports events. The Young Men's and the Young Women's Christian associations, Scottish Rite Cathedral, Masonic Temple, Christian Brothers College, the Home for Little Wanderers, the State Hospital for mental diseases, the Sisters of St. Joseph Hospital, Missouri Methodist Hospital, Sacred Heart Convent, and numerous fine church structures of different denominations make up a goodly number of the finer structures of the city. Other improvements consist of two baseball stadiums, one for soft ball and the other for professional use by the major leagues.

Government and Civic Conditions.—The council form of government is in force in St. Joseph, consisting of the mayor and five councilmen, all being elective offices. The city lighting is supplied by a local utility as well as natural gas used for residence and industrial consumption. The city is supplied with water through an extensive system of waterworks, first built in 1879 and improved and extended since that time until it now represents one of the finest water supply systems of any city of equal size.

History.—In 1826, Joseph Robidoux, born in St. Louis of French parentage, established a trading post at this point, known as the Blacksnake Hills, and thus became the founder of the city, which he later christened with his own name. For hundreds of miles on every side the whole country was then an unbroken wilderness, inhabited only by the aborigines, who gained a scanty subsistence by trapping and hunting. The furs and pelts of the wild animals they killed soon became a source of extensive traffic between the trader and his Indian neighbors. The famous Platte Purchase was accomplished through a treaty with the Indians, dated Sept. 17, 1836. The trading post grew into a town, incorporated in 1845 and then into a city, incorporated in 1851. Its growth at first was not rapid, but steady and gradual. Planted, however, in the midst of one of the finest and wealthiest agricultural sections of the United States, and drawing to itself the larger part of the trade that came from the country to the westward, it later on began to assume a more vigorous and rapid growth. In 1880 it had a population of 32,431; in 1940, 75,711; and in 1950, 78,588.

SAINT JOSEPH, island in Lake Huron belonging to Canada. It is at the mouth of St. Mary's River and near the mainland of both Michigan and Ontario. There are many high bluffs and large rocks on the coast, but nearby the whole of the surface is covered with trees, shrubs and flowers.

SAINT JOSEPH, lake in northwestern Ontario, Canada; 187 square miles. The Albany River is its outlet into James Bay.

SAINT JOSEPH, (1) river, Michigan, whose source is in Hillsdale County. It flows west-northwest, then south into Indiana, west, then northwest, returning to Michigan and entering Lake Michigan at St. Joseph, Mich. South Bend, Ind., is on the banks of this river,

at the head of navigation. Its total length is about 250 miles. (2) Another river of the same name rises in the southwestern part of Michigan, crosses the northwestern corner of Ohio, enters Indiana and flows southwest and unites with Saint Mary's River at Fort Wayne, to form the Maumee (q.v.). Its total length is about 100 miles.

SAINT JOSEPH D'ALMA, săn zhō-zĕf' dăl-mà', town, Quebec; county seat of East Lake St. John County; located on Alma, an island in Lake St. John, at the point where the waters of the lake discharge into the Saguenay River. There is a railroad connection with Jonquière, and the town has some industry, a bank, a weekly newspaper, and a chamber of commerce. Pop. (1951) 8,028.

SAINT-JUST, săn zhüst', **Louis Antoine Léon de,** French revolutionary: b. Decize, France, Aug. 25, 1767; d. Paris, July 28, 1794. The son of an army officer, he received a good education, read widely, and was influenced by the writings of Jean Jacques Rousseau to attach himself to the republican movement that deposed Louis XVI. He corresponded with Maximilien François Marie Isidore de Robespierre (q.v.), and through Robespierre's influence in 1792 was elected deputy for Aisne in the revolutionary National Convention. His maiden speech to the Convention was a plea for harsh treatment of Louis XVI.

Saint-Just became a member of the Committee of Public Safety (q.v.) in 1793 and subsequently helped to bring the Convention under its domination. With Robespierre he prepared the Reign of Terror, organizing the destruction of the Girondist (q.v.), or moderate, revolutionary faction and the execution of numerous émigrés and suspected monarchists.

Meanwhile, in the fall of 1793, French republican armies on the Rhine were yielding before an invasion by various European monarchies in coalition, and Saint-Just was dispatched by the Committee of Public Safety as a special commissioner to redress the military situation. He was brilliantly successful, and on his return was elected president of the Convention. He formed with Robespierre and Georges Couthon a temporarily invincible triumvirate which secured the execution of numerous opponents in the Convention, notably Jacques René Hébert and Georges Jacques Danton. In July 1794, Saint-Just was recalled to Paris from a mission to the republican army of the north, in Belgium. Robespierre was threatened by various political enemies and needed his help. On July 27 (the 9th of Thermidor), Saint-Just tried to advocate in the Convention a dictatorship controlled by Robespierre's faction. He was interrupted, denounced, and arrested. The next day, with Robespierre and others, he was guillotined. Saint-Just was the author of numerous political writings. See also FRENCH REVOLUTION.

Consult Bruun, Geoffrey, *Saint-Just: Apostle of the Terror* (New York 1932).

SAINT KILDA, sânt kĭl'dà, island, Scotland, of the Outer Hebrides group, located in the Atlantic Ocean, off Scotland, about 40 miles west of North Uist. It is three miles long and two miles wide, but has only about 40 acres of arable land. Its shores rise in perpendicular cliffs except for a landing place on the southeast. The highest point is 1,220 feet. The population dwindled from 110 in 1851 to 35 in 1935, when all inhabitants removed to the mainland and the island became a bird sanctuary.

SAINT KITTS, West Indies. See SAINT CHRISTOPHER.

SAINT LAMBERT, sânt lăm'bĕrt, Fr. săn läN bâr', residential city, Quebec, Canada; located in Chambly County, on the south shore of the St. Lawrence River, immediately opposite Montreal. It is at the end of the Victoria Bridge of the Canadian National Railway and has extensive railway yards. Pop. (1951) 8,416, about one-third French speaking.

SAINT LAURENT, săn lô-räN', **Louis Stephen,** prime minister of Canada: b. Compton, Quebec, Canada, Feb. 1, 1882. The son of a French-Canadian storekeeper of Compton and an Irish-Canadian mother, he was educated at St. Charles College, Sherbrooke, and at Laval University, Quebec, where he was graduated at law. He was admitted to the bar in 1905 and appointed professor of law at Laval University in 1914. A King's Counsel in 1915, he served as batonnier of the Quebec City Bar, was batonnier-general of the bar of the Province of Quebec from 1929 to 1930, and for the next two years was president of the Canadian Bar Association. In December 1941, he was appointed minister of justice and attorney general for Canada in the Cabinet of Prime Minister W. L. Mackenzie King. First elected to Parliament as Liberal member for Quebec East in 1942, he was returned again in elections held in 1945, 1949, and 1953. He resigned from the Ministry of Justice in 1946 to become secretary of state for external affairs. He was deputy chairman of the Canadian delegation to the United Nations Conference in San Francisco in 1945 and chairman of the Canadian delegation at the first session of the United Nations General Assembly in London early in 1946. On the retirement of Prime Minister Mackenzie King, Nov. 15, 1948, Saint Laurent succeeded to the premiership.

Speaking French and English with equal fluency, he was the second French-Canadian to become prime minister. In 1951, on the tenth anniversary of his entry into federal politics, all parties in Parliament joined in an unusual expression of appreciation for his services to Canada. His name is particularly associated with his support of grants to the provinces for the conservation of water resources and for aiding the fisheries industry.

SAINT LAURENT, residential town, Quebec, Canada, on the Island of Montreal, west of Mount Royal and Montreal proper. It is part of Greater Montreal and is connected with Montreal by rail, bus, and tramway. Local plants produce sheet metal products, medical and pharmaceutical preparations, and cooking apparatus. Originally a mission, St. Laurent was incorporated as a village in 1845 and as a town in 1901. Pop. (1951) 19,918.

SAINT LAWRENCE, Cape, sânt lâ'rĕns, the northwest projection of Cape Breton Island, Nova Scotia, into the Gulf of St. Lawrence, 65 miles north-northwest of Sydney.

SAINT LAWRENCE CANALS. See CANADIAN CANALS—*St. Lawrence Canals.*

SAINT LAWRENCE ISLAND, island, Alaska, in the Bering Sea southwest of Seward Peninsula, about 120 miles from the Alaskan mainland. It is about 95 miles long and from 10 to 35 miles wide, with rugged terrain rising to 2,070 feet. All vegetation is of the tundra type. The island is inhabited by Eskimos engaged in whaling and fox trapping. Eskimo cultures here, traced back 2,000 years, are of interest to anthropologists. The island was discovered in 1728.

SAINT LAWRENCE RIVER AND GULF. The St. Lawrence, a major river of North America, is the only important one whose course trends roughly from west to east. Hence, its valley forms a part of the international boundary between the United States and Canada.

It drains the most extensive bodies of fresh water in the world, the five largest appropriately called the Great Lakes. These give it the unique distinction of having more than 95,000 square miles of its drainage area composed of water surfaces.

On some maps the St. Lawrence is depicted as merely providing the outlet of Lake Ontario and terminating where its broad estuary merges some 750 miles away into a gulf of the Atlantic. But a more correct appraisal would chart its source from the St. Louis River, winding through the forests of upper Minnesota to empty into the farther corner of Lake Superior; for such remote streams and the lakes which receive their waters are all essential parts of one great river system whose length exceeds 2,100 miles and whose drainage area embraces 565,000 square miles.

The St. Lawrence is a relic of the ice age. In contrast with the Colorado, which has gnawed at its cavernous gorges for millions of years, the St. Lawrence is comparatively youthful. It took form when the continental ice fields, which once covered four million square miles of North America, retreated toward the Arctic leaving a maze of lakes and swamps and worn down uplands; of terminal moraines and deeply etched valleys. In the course of its development from this topographical chaos, the St. Lawrence appropriated some areas once served by the Mississippi and the Hudson.

Long ago, when warmer temperatures prevailed, the beds of the Great Lakes were the valleys of forgotten rivers which probably differed little from that of the Ohio. Their erosions were accelerated by the gouging of great masses of slowly moving ice that may have attained a maximum thickness of nearly two miles. The bed of Lake Superior is of particular interest, for later strata seem to have been worn away down to the ancient Paleozoic floor. Not only were the basins of the lakes deepened and enlarged but vast deposits of glacial clay and sand and coarser drift remodeled their outlines. In some places these deposits are two hundred feet deep.

As the ice fields retreated their melting waters inundated much greater areas than they do today. Then individual lakes enlarged their bounds or coalesced with others to form super lakes. Such glacial monstrosities as Algonquin and Iroquois have been traced in plainly marked beaches. Some of these beaches south of Lake Erie are now 220 feet above the prevailing water levels, east of Lake Huron they are 260 feet, while above the north shores of Superior they have been etched in the uplands as much as 600 feet above the surface of that inland sea. The soils exposed along these beaches differ greatly from the remoter uplands and possess many of the characteristics of silted lake beds.

A current flows continuously through the Great Lakes sustained by an annual precipitation of more than 30 inches. But the St. Lawrence is also swelled by important tributaries. Among these are the Richelieu, flowing northward from Lake Champlain, the Ottawa, 605 miles long, bearing from the west the surplus of many glacial lakes, and the Saguenay, sweeping down from interior Ontario, guarded by those giant cliffs, Capes Trinity and Eternity.

At Niagara the St. Lawrence is interrupted by one of the world's great waterfalls, a scenic marvel and the source of enormous water power. There are other natural obstructions to traffic, the rapids of the Sault Ste. Marie now flanked by gigantic locks, and the Lachine Rapids above the city of Montreal. The northern shores of Superior, which form the edge of the Great Canadian Shield, are grand and imposing, while the Thousand Islands of the St. Lawrence (they really total more than 1,500) attract innumerable visitors.

The first white man of record to sail the St. Lawrence was Jacques Cartier in 1534. He called it the River of Canada, but St. Lawrence, the name he had bestowed upon the outer gulf, was, by a vagary of history, preferred for the entire system.

For a long time the St. Lawrence was the only river appearing upon the sketchy maps of North America. Daring adventurers, eager to create a French Empire in the New World, found it a broad highway into the hinterland. In 1603 Champlain established the first French settlement at Tadoussac, at the mouth of the Saguenay, and five years later laid the foundations of Quebec. In 1679 La Salle voyaged from Erie to Michigan on the *Griffon,* the first sailing vessel to navigate the Great Lakes. On the remotest shores of Superior the Sieur Du Lhut built the trading post destined to become Duluth. Meanwhile, French voyageurs followed natural waterways into the wilderness of the great northwest, fur buyers and traders with the Indians.

The St. Lawrence Valley was long a battle ground for warring tribes. The Iroquois, dwelling from the Adirondacks through the Finger Lake region, almost annihilated the less aggressive Eries and Hurons, who yet gave their names to two of the five Greak Lakes. Such hostilities persisted during the French and Indian Wars, for the struggle for world power between France and England, which had spread from the Mediterranean to the West Indies and India, involved Canada also. When Quebec, the western Gibraltar, fell to the army of General Wolfe, the tenuous French Empire in the northern sector of the continent collapsed. But hostilities broke out afresh in the War of the Revolution. Then Benedict Arnold led his daring attack on Montreal and General Burgoyne, thrusting southward down the Champlain Valley, almost succeeded in splitting the rebellious colonies in twain. The embers of conflict flamed afresh in the War of 1812, when American reverses at Niagara and Detroit were brightened by the naval victory on Lake Erie. Thereafter the energies of the two great English speaking peoples turned from conflict to more productive pursuits.

The settlement and commercial development of the St. Lawrence Valley is a more thrilling

romance than the former era of fur trapper and explorer. No other river system in the world can rival its multiplicity of enterprises or the volume of traffic upon its unequalled waterways. The eight states and two Canadian provinces which border its lakes and rivers have a combined population exceeding 45,000,000, including such American centers as Chicago, Detroit, Cleveland, Milwaukee, and Buffalo; and such Canadian cities as Montreal, Toronto, Quebec, and the beautiful capital at Ottawa.

The fisheries of the Great Lakes, though declining, have long been important. Forest resources are impressive and great rafts of pulp logs float across Superior. Among important mineral deposits the iron and copper mines of Michigan and the fabulous Mesabi Range in Minnesota are outstanding. The transportation of grain and iron ore has developed a unique type of ship, the turtle-backed steamer of the Great Lakes. Among manufacturing enterprises which have multiplied enormously are steel plants and automobile works.

The one major handicap is winter. Then, for several months, lake shipping seeks a harbor, and ice three feet thick forms on the upper river. But even then winter sports flourish, ice palaces are erected at Montreal and Quebec, and skiing, snowshoeing, and hockey exert an ever wider appeal.

In those weak links, where navigation is interrupted, man has assisted nature by digging canals and dredging channels. Although the Soo exit from Superior is closed for five months each year, more shipping passes through its locks than through the combined Suez and Panama canals, while the Detroit River has been called the busiest waterway in the world.

Ocean steamers ascend the St. Lawrence to Montreal. There canals bypass the rapids and flank Niagara to link Erie with Ontario. But as these limit vessels to a draught of 14 feet, a deeper ship canal has long been advocated. (See SAINT LAWRENCE SEAWAY.)

Estuary and Gulf.—Beyond Quebec the St. Lawrence assumes true Amazonian dimensions, nor is it clear where river terminates and sea begins. At Anticosti Island it is 90 miles across. Beyond that point horizons broaden into the spacious Gulf of St. Lawrence, nearly landlocked by Ontario, New Brunswick, Nova Scotia, Cape Breton Island, Newfoundland, and Labrador. Besides Anticosti it encloses Prince Edward Island and the Magdalen group. The estuary and much of the gulf fill a drowned valley, for the river channel has been traced to the edge of the continental shelf, a hundred miles beyond the shore line. The gulf opens into the Atlantic through the Gut of Canso which cuts off Cape Breton Island from Nova Scotia, Cabot Strait between Cape Breton Island and Newfoundland, and the Strait of Belle Isle, often choked with grounded icebergs, which separates Newfoundland from Labrador.

SAINT LAWRENCE SEAWAY, a projected navigable channel to connect the Great Lakes with the St. Lawrence River, thus making possible direct oceanic trade with the interior of Canada and the United States. The project was first proposed by the American-Canadian Deep Waterways Commission in 1897, and, after more than 50 years of negotiations marked by vigorous opposition from contending interests in the United States, a bill was passed by Congress and signed by the president on May 13, 1954, authorizing the United States government to participate with Canada in its construction.

The original proposals, including a power development project, were stated in the St. Lawrence Deep Waterway Treaty of 1932, which, as in the case of the Great Lakes-St. Lawrence Agreement of 1941, was rejected by the United States Congress. In 1951 the Canadian Parliament passed a bill authorizing the establishment of the St. Lawrence Seaway Authority, and in June of the next year, both countries made individual applications to the International Joint Commission for approval of power development in the International Rapids section of the St. Lawrence River. At the same time the Canadian government stated its intention to carry out, alone, the necessary work to provide deep-draft navigation between Lake Erie and Montreal.

In 1952, United States participation in the seaway project was urged by President Truman and in the following year, by President Eisenhower, as it had been by every United States president since Warren Harding. On Nov. 5, 1953, the New York State Power authority was authorized by the president to work in conjunction with the Ontario Hydro-Electric Power Commission on the proposed power project. With the final passage of the St. Lawrence Seaway bill in the next year, the president was authorized to establish the St. Lawrence Seaway Development Corporation, the counterpart to the Canadian St. Lawrence Seaway Authority. By the terms of the bill, the former would be responsible for construction of canals and locks on the 47-mile International Rapids section of the St. Lawrence River between Cornwall, Ont., and Lake Ontario. The authorization for this work, however, depended on Canada's agreement to undertake all other construction and improvements necessary to complete the seaway at a minimum depth of 25 feet from Duluth, Minn., to the Atlantic Ocean.

SAINT LAWRENCE UNIVERSITY, Canton, New York, was chartered April 1856 for the purpose of "establishing, maintaining and conducting a college for the promotion of general education and to cultivate and advance literature, science and the arts, and to maintain a theological school." Like all other colleges of the state, it is a constituent part of the educational system called the University of the State of New York. It now includes the College of Letters and Science, the Theological School, the Law School, the New York State School of Agriculture. Each department is independent of the others in its faculty and funds and in the instruction and government of its students. The College of Letters and Science offers courses leading to the degrees of bachelor of arts and bachelor of science. From the first, women have been admitted on the same terms as men. The by-laws of the corporation, adopted in 1856, provide that "the College of Letters and Science is and shall remain an unsectarian foundation." Its undenominational character has been consistently maintained. In 1857 the legislature granted to the college $25,000, of which $10,000 was to be expended for "books and apparatus" and $15,000 was to be kept as a permanent fund. The remaining productive funds of the college,

which in 1949 exceeded $2,000,000, have been the result of private gifts.

The Theological School, as provided in the bylaws of the corporation, "is and shall remain an institution especially intended and organized for the preparation and training of persons for the ministry of the Universalist Church." It was opened by Ebenezer Fisher in 1858, and the first class was graduated in 1861. The establishment of a law school was authorized in 1869, and one was maintained at Canton from 1869 to 1872, two classes being graduated. In 1903 the Brooklyn Law School was placed under the control of the university. A three-year course leads to the degree of bachelor of laws. The New York State School of Agriculture, established in 1906, is maintained by the state. It comprises an agricultural division and a domestic science division for women. No degrees are conferred on the graduates of this school as such, but certificates are given on the completion of the prescribed courses.

In 1948–1949 the university had a total enrollment of 1,445 students, of whom 424 were women. Buildings, grounds, and equipment were valued at $4,500,000 in that year, and there were 95,000 volumes in the university library.

SAINT LEGER, sânt lĕj'ĕr, or sĕl'ĭn-jĕr, **Barry,** British soldier: b. 1737; d. 1789. He served in the siege of Louisburg in 1758, and under Gen. James Wolfe at Quebec, and checked the flight of the British forces on the Heights of Abraham. In the Revolutionary War he led the expedition against Fort Stanwix. At the close of his career in the army in 1784, he was commandant of the royal forces in Canada.

SAINT LEO, town, Florida, in Pasco County; altitude 140 feet; 5 miles southwest of Dade City; served by the Seaboard and Atlantic Coast Line railroads. It is named after the Benedictine abbey of St. Leo (1889), located on the shore of the adjoining Lake Jovita, and around which the farming population grew. The abbey includes a boys' preparatory college staffed by Benedictine monks. The abbey church, open to the public, was built under the direction of the Rt. Rev. Francis Sadlier. Major industries are citrus and cattle. Pop. (1950) 261.

SAINT-LO, France, historic Norman town and capital of Manche Department, is situated on a rocky hill dominating the Vire River, about 48 miles by rail southeast of Cherbourg. Of Gallic origin, it was known during the Gallo-Roman period as Briovera, but was renamed in the 6th century for Laudus, or Lô, bishop of Coutances. The town was fortified in Charlemagne's reign, and during the Middle Ages was besieged and plundered several times. During this period it became a weaving center, and in modern times continues to manufacture textiles. During the Reformation it accepted Calvinism and was involved in the religious wars of the 16th century. In 1574 the town was attacked and a number of local Huguenots were massacred. The Church of Notre Dame, built from the 14th to the 16th centuries, was ruined in World War II, when the town, which served as a German strong point in the Normandy campaign, was besieged by Allied forces. It was liberated by the United States 29th Division on July 18, 1944. St. Lô was the birthplace of the novelist Octave Feuillet and of the astronomer Urbain Jean Joseph Leverrier (qq.v.). Pop. (est. 1948) 6,010.

SAINT LOUIS, sânt lōō'ĭs, city, Michigan, in Gratiot County, situated at an altitude of 740 feet, 36 miles west of Saginaw, on the Chesapeake and Ohio Railroad. The city was settled in 1853 and early became known as a health resort because of its mineral springs. Its industrial life centers around the refining of petroleum, flour milling, and the manufacture of beet sugar. There is also a plant producing DDT. Nearby is the Lumberjacks' and Rivermen's Park, which contains a museum of the old Michigan lumber industry. Pop. (1940) 3,039; (1950) 3,347.

SAINT LOUIS, city, Missouri, metropolis of the state and largest city of the Mississippi Valley, is situated on the west bank of the Mississippi 20 miles below its confluence with the Missouri. The site was chosen as a convenient point for trade with the Indians of the Mississippi-Missouri river system and of the Illinois and Ohio rivers as well. This central location has been a major factor in the development of St. Louis as a manufacturing and distribution center.

Topography and Climate.—Confined within boundaries fixed in 1876, the city has a frontage along the Mississippi River of 19 miles and a total land area of 61 square miles. The general elevation is 465 feet; the barometer elevation, 621 feet. The terrain, which rises from the river front, is interrupted by several low valleys.

The oldest and best known of the five bridges spanning the Mississippi at St. Louis is Eads Bridge, opened in May 1874. The overall length of the bridge and the tunnel at its western end is 6,220 feet. The tunnel passes under the main downtown business section of St. Louis and opens in Mill Creek valley, a wide depression extending westward from the river to the city limits, and one of the principal business and industrial areas. The lower end of the valley was once the site of an artificial lake, known as Chouteau's Pond, which covered more than 100 acres and was a popular resort and recreation center. When the construction of the first railroad west of the Mississippi—the Pacific Railway, now the Missouri Pacific—was begun in 1851, the valley was chosen as its course, and the lake was drained and the valley filled to form a roadbed. Mill Creek valley is now spanned by a number of viaducts.

St. Louis is the center of a metropolitan area which includes St. Louis and St. Charles counties, west of the city in Missouri, and Madison and St. Clair counties, across the Mississippi in Illinois. Among the larger incorporated areas suburban to St. Louis in Missouri are Clayton, Ferguson, Glendale, Kirkwood, Maplewood, St. Charles, University City, and Webster Groves. Directly across the river is East St. Louis, Ill., with such surrounding towns as Alton, Belleville, Collinsville, Edwardsville, Granite City, Venice, and Wood River.

The climate of St. Louis is moderate, with an average mean temperature of 56.2°F. The annual precipitation averages 37.44 inches and falls on an average of 111 days. The mean snowfall is 17.6 inches. The average percentage of possible sunshine is 59 per cent; the average relative humidity, 64 per cent; and the average wind velocity, 10.9 miles per hour.

Population.—According to the census of

Above: Symbols of the industrial city of St. Louis— a grain elevator, a freight locomotive in the foreground, and a big power plant across the river in East St. Louis, Ill.

ST. LOUIS

Right: In Forest Park, St. Louis, stands this bronze statue of St. Louis, the crusader for whom the city is named.

Below: The skyline of St. Louis as seen through the piers of the MacArthur Bridge over the Mississippi.

(Above and right) Charles Phelps Cushing; (below) Ewing Galloway

Above: A view of St. Louis showing the Mississippi River and, in the foreground, the Memorial Plaza.

Left: The Union Station in St. Louis serves 23 trunk-line railroads.

(Above) St. Louis Chamber of Commerce; (left) Ewing Galloway

Above: The Eads Bridge, St. Louis' first bridge across the Mississippi, was a great engineering feat in its day (1874). It was the world's first bridge in which alloy steel was extensively used.

Below: The Barnes Hospital Group, one of the finest hospital groups in the nation.

(Above) St. Louis Chamber of Commerce; (below) photo by Howard Earl Day

1950, the population of St. Louis is 856,796, representing an increase of 4.4 per cent over the 1940 total of 816,048. Because of the restrictions on the territorial limits of the city, which periodic efforts have failed to remove, growth has been more rapid in the suburban communities of the metropolitan area. The area as a whole has the highest ratio of native-born white persons with native-born parents among the major metropolitan areas of the United States. In the city itself, approximately 87 per cent of the population is white, and some 13 per cent is Negro.

Commerce and Industry.—Founded as a fur-trading center, St. Louis was for many years the world's largest raw fur market. It also grew into one of the leading commercial, industrial, financial, and distribution centers of the United States.

Manufacturing.—According to the *Census of Manufactures, 1947,* the St. Louis Metropolitan Area ranks ninth in value added by manufacture among the 53 major industrial areas established by the Bureau of the Census and is second only to the Los Angeles Metropolitan Area among those west of the Mississippi. One of the most significant characteristics of its industry is its diversification, no more than 8 per cent of the labor force being employed in any one industry. A total of 3,300 different products are manufactured in the area. Despite its territorial restrictions, the city of St. Louis accounts for most of this industrial activity, with 2,330 manufacturing establishments of the 2,960 in the area as a whole in 1947. According to the census taken in that year, the value added by manufacture was $1,296,471,000 for the area, of which $911,107,000 was contributed by the city.

In addition to its strategic location and moderate climate, the principal factors in St. Louis' industrial development have been its proximity to sources of raw materials, adequate fuel and water supplies, excellent transportation facilities, and ample steam and hydroelectric power. The waterpower is generated from the Mississippi River and at a large plant on the Osage River, where, in 1929–1931, Bagnell Dam was built, forming the 20,000-acre Lake of the Ozarks.

Principal manufactures include: alloys and alloy castings, aircraft and parts, automobiles and parts, bakery products, beer, bricks, candy, caskets, chemicals, clothing, drugs, electrical machinery, food preparations, footwear, furniture, hardware, iron and steel castings, machine shop products, meat packing, millinery, paints and varnishes, paper products, prepared animal feed, railroad cars, refrigerators, roofing, steel works and rolling mill products, stoves, textile bags, tin cans, tobacco, and wirework. Of particular consequence since the 1930's is the growth of the city as a producer of chemicals and as a center of women's fashions.

Wholesale Trade.—Its surrounding territory unbroken by natural barriers, St. Louis is one of the major distribution centers of the United States. Wholesale sales from the St. Louis market approximate $3,000,000,000 a year. The principal groups in this trade are dry goods and clothing; food and tobacco; farm products; automotive products; metals and minerals; machinery equipment and supplies; chemicals, drugs, and allied products; electrical, lumber, and building products materials; hardware; petroleum and products; paper and products; plumbing; furniture and home furnishings; and sporting goods.

Retail Trade.—Some 5,000,000 people live within a radius of 150 miles of St. Louis, a district which embraces rich agricultural land, the oilfields and coalfields of Illinois, the largest lead mines in the world, and a wide range of other industrial and commercial activity. The retail sales of the city proper approximate $1,165,000,000 a year, or over $1,300 per capita. Since the 1930's there has been an extensive growth of outlying shopping centers in the northwest and southwest sections of the city, and outside the city limits in St. Louis County.

Transportation and Communications.—St. Louis is second only to Chicago among the railroad centers of the United States. It is served by 18 trunkline railroads: Baltimore & Ohio; Chicago & Eastern Illinois; Chicago, Burlington & Quincy; Chicago, Rock Island and Pacific; Gulf, Mobile and Ohio; Illinois Central; Illinois Terminal; Litchfield and Madison; Louisville & Nashville; Missouri-Kansas-Texas; Missouri Pacific; New York Central; New York, Chicago and St. Louis; Pennsylvania; St. Louis-San Francisco; St. Louis-Southwestern; Southern; and Wabash. There are 2 shortline railroads with terminals in the city—the St. Louis, Belleville Electric and the St. Louis & O'Fallon. There are also 4 switching railroads in St. Louis —the Alton and Southern; East St. Louis Junction; Manufacturers; and Terminal Railroad Association of St. Louis—and 1 in Alton, the Missouri & Illinois Bridge & Belt. The Union Station, at 18th and Market streets in the Mill Creek valley, is used for passenger service by all the principal railroads except the Illinois Terminal.

Since its founding St. Louis has relied heavily on river transport. Today it stands at the center of the Mississippi River Waterway, the largest inland waterway in the world (see MISSISSIPPI RIVER; WATERWAYS OF THE UNITED STATES). The Federal Barge Lines and the Mississippi Valley Barge Line Company provide long-haul freight service by barge from St. Louis, operating to the south the year around and to the north for eight months of the year. In addition, irregular barge transport is available.

The focal point of a network of modern highways, the city is also served by buses and trucks with service to, or connections with, every section of the country. A total of 269 trucklines and 22 regularly scheduled buslines operate out of St. Louis.

Five major airline companies serve the city: American Airlines, Chicago & Southern Air Lines, Trans World Airline, Eastern Air Lines, and Mid-Continent Airlines. One all-cargo carrier, Slick Airlines, and several charter lines were also in operation in 1950.

There are three daily newspapers: the *Post-Dispatch,* formed by a merger of the *Post* and the St. Louis *Dispatch* made by Joseph Pulitzer in 1878; the *Globe-Democrat,* formed in 1875 by the consolidation of the *Globe* and the *Missouri Democrat* (founded in 1852); and the *Star-Times,* formed by a merger of two earlier newspapers (founded in 1878 and 1895, respectively) in 1935. As of 1950, there were 9 standard AM broadcasting stations, 3 FM stations, and 1 television station operating in the city.

Government.—Before 1876 the city and St. Louis County formed a judicial, and, in certain respects, an administrative, unit. In that year the city and county were separated, the boundaries

of the city were enlarged to their present limits, and a new city charter was adopted. The charter provided for the election of the mayor for a term of four years, with enlarged powers; for the division of the city into 28 legislative districts, or wards; for the continuance of a bicameral city council; for the establishment of a department of health; for an elective public school board consisting of one member from each of the wards; and for the creation of other boards and agencies.

In 1914 a new charter, introducing several important changes in the city's government, was put into effect. The number of elective offices was reduced; the appointive powers of the mayor were increased; the city council, or board of Aldermen, was made a unicameral body, and each member was required to reside in the ward he represented; the budget system was introduced; the right to municipal ownership of public utilities was granted; and provision was made for the use of the initiative, referendum, and recall.

Although the city has been a separate political unit since 1876, it retains certain features of county administrative procedure. The mayor has the right of appointment of top administrative officers, but most of the municipal employees in lesser positions come under a civil service system which greatly restricts his appointive powers. Such county officers as the sheriff, recorder of deeds, and public administrator have been retained. The police force, which is part of the St. Louis metropolitan system created by the state legislature in 1881, is under the direction of a board of police commissioners appointed by the governor; the mayor is an ex officio member of this board. Also under the control of the state are the functions of the collector of revenue, license collector, and board of election commissioners.

Educational and Cultural Facilities.—St. Louis is one of the leading cultural centers of the United States. Its educational facilities embrace a modern public school system, including vocational schools, junior colleges, and teachers colleges; a number of private and parochial elementary and secondary schools; and several institutions of higher learning. Among the latter are Washington University (q.v., nonsectarian), St. Louis University (q.v., Roman Catholic), and Concordia and Kenrick seminaries. In addition, there are numerous technical and professional schools. Both Washington and St. Louis universities maintain excellent medical schools which are affiliated with St. Louis hospitals.

The city has outstanding library facilities. The central building of the Public Library, a three-story granite edifice of Italian Renaissance design near the downtown section, was erected in 1912; it circulates more than 2,000,000 books a year and has extensive reference facilities. There are also 19 branch libraries, a mobile service, and service to the public schools. The St. Louis Mercantile Library Association, founded in 1846, is the oldest institution of its kind west of the Mississippi River; it maintains a subscription library with 179,225 volumes (1945). Other collections include those of the universities, the Academy of Science, the Law Library Association of St. Louis, the Missouri Historical Society, and the Missouri Botanical Garden.

The headquarters of the Missouri Historical Society is the Jefferson Memorial, a two-story, white limestone building of modified classic design, which stands on the site of the entrance to the Louisiana Purchase Exposition of 1904 and was built from funds remaining at the close of the exposition. Donated to the city by the directors of the exposition, it was opened to the public in 1913. In the center of the loggia is a large bronze statue of Thomas Jefferson by Karl Theodore Francis Bitter, while a wall of the east wing of the memorial contains a relief by the same artist portraying James Monroe, Robert R. Livingston, and Marquis François de Barbé-Marbois signing the Louisiana Purchase Treaty. The east wing houses the historical society's offices; the library, which has an extensive collection of books and manuscripts pertaining to the state and region as well as one of the largest collections of Jefferson manuscripts in the United States and many of the manuscripts relating to the Hamilton-Burr controversy; and a large museum of Missouriana. The west wing contains trophies received by Charles A. Lindbergh following his flight to Paris in *The Spirit of St. Louis* in 1927.

Founded by Henry Shaw, a St. Louis philanthropist, in 1858, and opened to the public in 1860, the Missouri Botanical Garden (also called Shaw's Garden) contains the largest collection of plant life in the Western Hemisphere, with representatives of more than 12,000 species. In addition to the city garden of 75 acres, there is an arboretum of 1,625 acres at Gray Summit, Mo., and a tropical extension at Balboa, Panama. All facilities are maintained through an endowment set up by Shaw, and admission is free. At the city garden, in addition to extensive outdoor gardens there are large conservatories containing a varied collection of tropical plants and featuring displays of chrysanthemums, orchids, lilies, tropical vines, ferns, palms, desert cacti, and plants from Australia, the Philippines, and Japan.

The City Art Museum of St. Louis, situated on top of Art Hill in Forest Park, is a Bedford stone structure of classic Roman architecture, erected as the main art building of the Louisiana Purchase Exposition and donated to the city by the exposition committee. In front of the museum is a bronze equestrian statue of Louis IX of France, for whom the city was named. The museum contains rich exhibits of paintings, casts, sculpture, drawings, and applied art. It has a fine collection of Chinese bronzes, pottery, and painting. Since 1907 a direct tax has been levied for the support of the museum. Admission is free.

The Henry W. Kiel Municipal Auditorium, a stone building of modified classic design completed in 1934, contains a convention hall seating 11,500, an opera house seating 3,500, and various assembly halls. In the Auditorium Opera House the concerts of the St. Louis Symphony Orchestra and the presentations of the Grand Opera Association and other groups are given. The orchestra, one of the oldest in the United States, was founded in 1880; concerts are given from October to March. Grand opera is presented annually under the auspices of the association.

The St. Louis Municipal Theater, in Forest Park, is an outdoor theater seating more than 10,000 persons; 1,700 places are free nightly. Since 1919 light operas and operettas have been presented here each summer. The Muny Opera, as it is popularly called, has a season lasting 12 weeks and attracts an annual attendance of more than 750,000.

Other cultural organizations in the city include the St. Louis Playgoers Association, which

sponsors the presentation of legitimate plays; the Little Theatre, established in 1926; the Light Opera Guild; and the St. Louis Artists' Guild (see section on *History*).

Parks, Recreational Facilities, and Other Points of Interest.—St. Louis has 69 parks, covering approximately 3,000 acres, and some 50 playgrounds. The city maintains over 100 tennis courts, many baseball and softball grounds, football and soccer fields, fly and bait casting docks, horseshoe courts, archery ranges, and golf courses. A number of the parks have facilities for skating and canoeing and bridle paths. Outdoor and indoor swimming pools, community center buildings, and public bathhouses are also maintained by the city.

The largest of the parks, Forest Park, covers 1,382 acres and is a center for much of the city's recreational and cultural activity. In addition to the buildings described in the section on *Educational and Cultural Facilities,* it contains the Jewel Box, a steel and glass conservatory housing floral displays from the city's greenhouses; three golf courses and numerous athletic fields; and the 77-acre Zoological Garden (St. Louis Zoo), which has some 2,000 animals. Planned to show the animals in natural settings, the zoo has pioneered in the construction of replicas of natural geological formations. Such special features as the chimpanzee circus and the elephant, lion, and other shows are very popular. The zoo is supported by a direct municipal tax.

O'Fallon Park, in the northern part of the city, covers 159 acres and occupies a commanding position overlooking the Mississippi. Tower Grove Park (277 acres), in the southern part of the city adjacent to the Missouri Botanical Garden, was also given to the city by Henry Shaw. It contains a wide variety of rare trees and shrubs. Around a statue of William Shakespeare are memorial trees planted by noted Shakespearean actors of former times. Chain of Rocks Park, in the extreme northern section of the city, affords a good view of the river; Fairgrounds Park, also in north St. Louis and formerly the scene of county fairs and horse races, now contains a large swimming pool and extensive playground facilities. Lafayette Park, the oldest in the city, was set aside from the city commons in 1836. The city also maintains Tilles Park in St. Louis County, a wooded tract of 58 acres equipped with a wading pool, tennis courts, fireplaces, and other facilities.

All parks and recreational facilities are under a municipal department, and the city has pioneered in the encouragement of recreation and outdoor sports. The Municipal Athletic League, conducted under city auspices, consists of baseball, soccer, basketball, tennis, swimming, and other groups; it has done much to broaden participation in amateur sports. In the professional field, the city is the home of two major league baseball clubs, the Cardinals of the National League and the Browns of the American League. Both teams play at Sportsman's Park, which is in the north central part of the city. Professional ice hockey games and other sports are presented in the large indoor Arena. Wrestling matches, prize fights, and other sports events are held in the Municipal Auditorium.

Boating and yachting on the Mississippi are popular, as are day and evening steamer excursions. A few miles west of the city is Babler Memorial State Park, a wooded tract of more than 1,000 acres. In addition, the Missouri Ozarks are easily accessible from St. Louis, and the Lake of the Ozarks (see section on *Manufacturing*) attracts many visitors from the city.

Among the principal events in St. Louis each year is the visit of the Veiled Prophet, a mystical monarch whose identity remains secret. His arrival early in October is heralded by a parade of 20 floats, colorfully designed, usually with storybook themes. On the following evening he rules over a formal ball at which he crowns a St. Louis debutante to reign in his stead for the ensuing year. The ball, first held in 1878, is considered the opening of the fall social season. More recent is the annual celebration of St. Louis Week, sponsored by the city administration and the St. Louis Chamber of Commerce. It features an exhibition at the Municipal Auditorium of the activities of municipal departments and public agencies.

Many of the major public buildings of St. Louis—the City Hall, the Public Library, the Municipal Auditorium, the Municipal Courts Building, the United States Customs and Courthouse Building, the Civil Courts Building, the Soldiers' Memorial Building—are grouped around Memorial Plaza, which forms the Civic Center. The Civil Courts Building, a 14-story structure completed in 1930, is an unusual combination of architecture. The first 12 stories, of modern office building design, are surmounted by an Ionic temple, which is crowned by an Egyptian pyramid. The Soldiers' Memorial Building, completed in 1938, is a two-story white granite edifice. The first story comprises a loggia and two museums surrounded by a portico with large, squared columns. The loggia contains a cenotaph with the names of the 1,249 St. Louis soldiers who were killed in World War I; the museums house war trophies and relics. The second story, a plain superstructure, is used chiefly as assembly rooms for service organizations. Directly in front of the building and in the center of the plaza is a monument to those who died in World War II. Farther downtown is the Old Court House, a two-story Classic Revival structure, shaped somewhat like a cross and surmounted by a 128-ton cast iron dome, rising to a height of 198 feet. It was built chiefly between 1839 and 1845, but was not entirely finished until 1862. It has many associations with the early civic life of St. Louis, and is identified especially as the place where the Dred Scott case (q.v.) was first tried.

Also on Memorial Plaza is Christ Church Cathedral (Protestant Episcopal), a Gothic structure built between 1859 and 1867, with additions made in 1894 and 1911. The most historic church in the city is the Roman Catholic Church of St. Louis of France (until 1914 the cathedral of the St. Louis archdiocese), a limestone edifice of Greek Revival design. Erected in 1831–1834, it is the fourth building on the site on which the first mass in St. Louis was celebrated, in 1764. The Cathedral of St. Louis, begun in 1907 and dedicated in 1914, is a gray granite edifice of Byzantine architecture, with the floor plan in the shape of a Greek cross. It has three domes, the central one rising to a height of 227 feet, and two towers, which attain a height of 157 feet. There are two large rose windows, and the interior is decorated with mosaic panels and various works of religious art.

Among other points of interest in the city are Aloe Plaza, opposite Union Station, which has a

200-foot pool and a fountain with cast bronze figures executed by Carl Milles (q.v.), called *The Meeting of the Waters;* the Old Rock House (1818), on the river front, which was used as a headquarters by the early fur traders; the Old Arsenal, dating from 1830; the Eugene Field House, now a museum, where the poet was born in 1850; and the Robert Campbell House, the ante-bellum home of one of the city's pioneer families, maintained as a museum. Near the city is the log cabin where Ulysses S. Grant lived as a young man.

St. Louis has cleared a 70-block area on its river front for the creation of a memorial to Thomas Jefferson and the Louisiana Purchase. In 1950 plans contemplated the construction of a large stainless steel arch 590 feet high, symbolizing the gateway to the West. The section along the river is in the hands of the National Park Service, which maintains local headquarters and a museum in the Old Court House.

History.—What is today the city of St. Louis was founded in 1764 by Pierre Laclède Liguest, better known as Pierre Laclède, as a settlement for the development of the fur trade west of the Mississippi River, that trade as far north as the St. Peters River having been conceded by the director general of Louisiana in 1762 to Col. Gilbert Antoine de St. Maxent and himself exclusively for a period of eight years. Acting on behalf of the syndicate of Maxent, Laclède, and Company, formed in New Orleans for the operation of the concession, Laclède set out with a party and supplies in August 1763 and arrived some weeks later at Fort Chartres, on the east bank of the Mississippi, below what was to become St. Louis, where he made his winter headquarters. In December he selected for his settlement a site on the west bank of the river, and early the following year sent over from the fort 30 workers to clear the ground and erect buildings, the work being directed by his 14-year-old stepson, René Auguste Chouteau (q.v.). The settlement, which Laclède named St. Louis, in honor of Louis XV and of the king's patron saint, Louis IX. After the surrender of Fort Chartres to the British in 1765, following the transfer of the French territory east of the Mississippi to Great Britain in 1763, other settlers moved to St. Louis from the French settlements of the fort and its vicinity.

Although the fur trade of the company was substantial from the outset, soon attaining a value of about $75,000 annually, the community encountered many difficulties during its early years. So short was the bread supply prior to 1767 that the settlement became widely known as Paincourt (Short Loaf). Following the surrender of Fort Chartres, its former commandant, Capt. Louis St. Ange de Bellerive, came to St. Louis with the soldiers under his command and established rule over the community and over Upper Louisiana. He was confirmed as local commander by Antonio de Ulloa, when he arrived in New Orleans in 1766 to effect transfer of Louisiana to Spain under the terms of the Treaty of Fontainebleau (1762). During his rule he gave to settlers of the community 81 titles to local parcels of land on the simple condition that the recipients improve it within a given period. With the arrival in 1770 of Don Pedro Piernas as the first Spanish lieutenant governor of Upper Louisiana, of which St. Louis served as the seat of government, de Bellerive's rule was terminated. Most of what had been done previously, however, was approved by Piernas, who appears to have pursued policies largely familiar and acceptable to the local population. In 1780, St. Louis was attacked by a contingent of British troops aided by a band of Indians, but it succeeded in repelling them despite its poor defenses. Toward the end of the century people from the United States began to settle in and near St. Louis and, with the purchase of Louisiana from France (to which it had been retroceded by Spain in 1800 by the Treaty of San Ildefonso) by the United States in 1803, their number steadily increased. The formal transfer of Upper Louisiana was made by the Spanish lieutenant governor, Col. Carlos Dehault Delassus, at St. Louis on March 9, 1804, to Capt. Amos Stoddard of the United States Army, who had been commissioned to act as agent for both France and the United States, the actual transfer occurring on March 10. Later in the same year the United States Congress created the District of Louisiana, with the seat of government at St. Louis, and in 1812 the Territory of Missouri, which in 1821 became the state of Missouri. Soon thereafter the capital was removed from St. Louis to nearby St. Charles, where it remained until 1826, when it was transferred to Jefferson City.

At the beginning of United States rule, St. Louis had a population of a little over 1,000, predominantly French, though there were a number of Americans, while the population of the outlying district on the west side of the Mississippi was slightly larger and about two thirds American. In 1808, St. Louis had 200 houses, about one fourth of which were of stone, and in the following year it was incorporated as a town. By 1821 its population had reached 5,600, and in 1822 it was chartered as a city, effective in 1823.

For many years after its founding the commerce and industry of St. Louis centered around the fur trade of the Missouri Valley and the Northwest. Among the early fur traders, whose operations in this region were conducted from St. Louis, were, in addition to Laclède, René Auguste Chouteau and Jean Pierre Chouteau (q.v.), two of the first settlers, and Manuel Lisa and Andrew Henry. In 1809 the St. Louis Missouri Fur Company was organized by Lisa, the Chouteaus, Henry, and others, but it was dissolved in 1814, and for several years thereafter its members engaged in the trade independently. One of the most successful of the traders was Lisa, who with Theodore Hunt in 1814 formed the Missouri Fur Company, and after its dissolution in 1817 organized another company under the same name (1819). He headed various trading expeditions and brought to St. Louis in a single season 15,000 buffalo skins. On June 14, 1817 he brought in a cargo of furs of various kinds valued at $35,000. In 1822, John Jacob Astor established at St. Louis the western department of the American Fur Company, thus intensifying the bitter competition with the St. Louis traders. In 1827 an alliance between the two groups was formed, through which the American Fur Company dominated the fur trade of the Northwest. Upon Astor's retirement in 1834, the business of the firm was divided. With the rapid rise of other local industries after 1840, the fur trade began to occupy a less conspicuous place in the commercial life of the city, although it continued for many years to play an important role.

The trade of the community was conducted chiefly by barter until the early part of the 19th

century. The first local bank, the Bank of St. Louis, was opened in 1816 with a capital of $100,000, but failed in 1819. The Bank of Missouri (private), opened in 1817, also failed, in 1821. The business of the town at this time was valued at around $1,000,000 a year. In 1829 a branch of the Bank of the United States was opened in the city. After the closing of this bank by President Andrew Jackson, the Bank of Missouri (state) was chartered in 1837, the central organization being located in St. Louis. Subsequently various private banks were organized, and in 1866 the state bank was sold to a private syndicate, the state abandoning its banking enterprise.

Prior to about 1840 the industrial development of St. Louis was slow. Its early manufactures were on a small scale, and included lumber, bricks, flour, foundry products, shoes and leather goods, furniture, lead, and tobacco. During the 1840's, however, it began to make rapid strides industrially as well as commercially. By the middle of the century its industries had greatly expanded, and its leading manufactures included stoves, foundry products, flour, sugar, brewery products, shoes and leather goods, cotton goods, lumber products, bricks, furniture, steamboats, tobacco, lead, and glass. It was also one of the leading meat packing centers of the United States. In 1860 the city had over 1,100 manufacturing establishments of various kinds, producing goods valued at approximately $27,000,000 annually.

Contributing greatly toward its industrial development was the improvement in its transportation facilities, which began with the introduction of steamboat service in 1817, when the *Zebulon M. Pike* arrived from Cincinnati. The trip between St. Louis, New Orleans, and other points along the Mississippi and Ohio, which previously had required weeks by sailboat, was reduced to days. Although the progress of steamboat service was slow at first, it began to advance rapidly during the 1830's. Steamboat arrivals in 1838 totaled 154, and by about 1850 St. Louis was third in rank among American cities in enrolled tonnage. Vessels arriving in 1860 numbered 5,178, and departures 5,218, while the total shipping cleared through the port was 844,039 tons. With the completion in 1852 of the first section of the Pacific Railway, railway service from St. Louis westward was begun. The building of other Western railways soon followed. Meanwhile, the completion and opening in 1857 of the Ohio and Mississippi Railroad, between St. Louis and Cincinnati, connecting with the Baltimore & Ohio Railroad, gave the city greatly improved communication with the Atlantic seaboard.

Following the acquisition of Louisiana by the United States, St. Louis became a gateway for the exploration and settlement of the West. Soon new settlers from Kentucky, Virginia, and other Eastern states and from Europe began to arrive in increasing numbers. By 1819 the Irish in St. Louis were sufficiently numerous to organize a local Hibernian society. German immigration to the city began on a considerable scale in the 1830's. The failure of the revolutions of 1848 brought a wave of German immigration, and during 1848–1850, 34,418 German immigrants arrived in St. Louis. In 1850 one third of the population of St. Louis was of German birth. Following the Irish famine of 1848, Irish immigration greatly increased. The population of the city, which was 16,469 in 1840, rose to 77,860 in 1850, 160,773 in 1860, and 310,864 in 1870. This was the period of greatest immigration. In 1870 the population included 200,000 natives of the United States, 80,000 of whom had been born outside Missouri; and 112,000 persons of foreign birth, chiefly German and Irish, the former numbering 50,640, and the latter 32,291. Until the decade 1870–1880 the population of St. Louis was larger than that of Chicago.

Between the period of early American rule and the Civil War the foundations for most of the cultural institutions of the city were laid. The early settlers were chiefly members of the Roman Catholic Church, which provided instruction in elementary subjects for the children of the community almost from the outset. For a number of years such instruction was given in the French language. The first English-speaking school was opened in 1804. Subsequently various private schools were conducted in English as well as in French, and the community depended upon these for instruction until its first public school was opened in 1837, a local public school board having been organized in 1833. The first public high school was opened in 1853. An academy organized by the Rt. Rev. Louis William Du Bourg, bishop of Louisiana, in 1818 became in 1820 St. Louis College, French continuing as the medium of instruction until the reorganization of the college under the direction of the Jesuits in 1828, when English was substituted. In 1832 the institution was chartered as St. Louis University, the first university chartered west of the Mississippi. In 1853, Eliot Seminary was founded as a nonsectarian institution, which in 1857 was renamed Washington University. Until the early 19th century the only ecclesiastical organization in St. Louis was the Roman Catholic Church, which had played an active role in the life of the community almost from its founding. In 1817 the First Presbyterian Church was organized, and in 1818 a Baptist church. Soon other Protestant bodies were organized. In 1821 the town had five new brick church edifices. Although the community had long been the residence of a bishop, the Roman Catholic diocese of St. Louis was not created until 1826. In 1847 the diocese was made an archdiocese. The first local newspaper, the *Missouri Gazette,* was founded in 1808 by Joseph Charless, and in 1822 became the *Missouri Republican.* (It became the *Republic* in 1888 and was absorbed by the *Globe-Democrat* in 1919). In 1837 the St. Louis Theater was opened, and later various musical organizations were formed. In 1851 several concerts were given in the city by Jenny Lind. Local agricultural and mechanical fairs were introduced during this period, and in 1856 the St. Louis Fair was begun, being held annually thereafter, except during the Civil War, until the beginning of the 20th century.

Over the issues that led to the Civil War the people of St. Louis were sharply divided, but upon the outbreak of the war the vast majority strongly supported the Union. The city was the headquarters of the Department of Missouri, which was under the command of Maj. Gen. John C. Frémont from July 25 to Nov. 2, 1861, and of his successor, Maj. Gen. Henry W. Halleck, whose territorial command was extended and reorganized in March 1862 as the Department of the Mississippi. Throughout the war it served as a Federal base of operations in the Mississippi Valley region but was never the scene of battle.

Considerable numbers of troops were stationed in and near the city, which for several months was governed by martial law, and many prisoners of war were interned there. As the headquarters of the Western Sanitary Commission, St. Louis was the center of much war relief activity, and thousands of refugees were cared for locally. Through large orders for supplies placed by the Federal quartermaster department local industries developed on a new scale.

After the war the city continued to advance rapidly along many lines. Beginning about 1880 railway transportation gained steadily at the expense of river traffic. Along with the city's economic development, its importance as a manufacturing and distributing center increased. Its population rose from 310,864 in 1870 to 350,518 in 1880, and to 451,770 in 1890. Culturally also the city made marked progress during this period. For some years after the war it was the center of an intellectual and philosophical development known as the St. Louis movement, which was based chiefly upon the philosophy of Georg Wilhelm Friedrich Hegel. The movement was initiated by Henry Conrad Brokmeyer, a Prussian who first came to St. Louis in 1856 and subsequently inspired a local group to undertake a study of the Hegelian idealistic philosophy. Notable among the group was William Torrey Harris (q.v.), identified with the public school system of the city from 1857 to 1880, first as a teacher and later as city superintendent. In 1866 he and Brokmeyer organized the St. Louis Philosophical Society, with Brokmeyer as president, and in the following year the *Journal of Speculative Philosophy* was founded by the society, with Harris as editor, and with the motto: "Philosophy can bake no bread but it can give us God, Freedom, and Immortality." In the initial issues of the *Journal,* which continued until 1893, were published the first English translations of important works of Hegel, Johann Gottlieb Fichte, and Friedrich von Schelling. The movement exercised a considerable influence upon the cultural development of St. Louis and of the Middle West.

During the latter part of the 19th century there was an increasing interest on the part of the community in art and music, and various organizations were founded for their encouragement. A major contribution toward the development of art appreciation in the city was made by Halsey Cooley Ives, who came to St. Louis in 1874 and began a free evening class in drawing, which evolved by 1879 into the St. Louis Museum and School of Fine Arts and later developed into a department of Washington University. The St. Louis Art Society was organized in 1872, the Sketch Club in 1877, and the Artists' Guild in 1886. A building was provided in 1881 to house the university's art collection, and in 1887 Hercules L. Dousman added a wing to his residence to house his private collection of art, which he opened to the public on certain days. Gradually, however, the need for a city art museum was recognized, and the building erected for the art exhibit of the Louisiana Purchase Exposition was donated to the city by the directors of the exposition. In 1880 the St. Louis Symphony Orchestra was formed.

By 1900 St. Louis had become a rapidly advancing metropolis, with a population of 575,238. In 1904 the Louisiana Purchase Exposition (q.v.), was held in the city, with great success. By 1910 the population had risen to 687,029, and by 1920 to 772,897. Despite the economic depression which began in 1929, the progress of the city was steady thereafter. In 1930 the population was 821,960, and in 1950, 852,253. In 1923, 1934, 1935, and 1944, large bond issues were voted for public improvements. Industry grew rapidly, and its diversified character was readily adaptable to the production of a wide variety of war materials during World War II. Important work was done toward urban redevelopment in order to eliminate blighted districts and to provide additional housing facilities. The Illinois-Missouri Development Compact, ratified by the two states in 1949, authorized the formation of a bistate agency to coordinate the continued development of the St. Louis Metropolitan Area. See also FUR TRADE; LOUISIANA PURCHASE; MISSOURI.

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SAINT-LOUIS, West Africa, city and administrative capital of the French colony of Senegal. It is situated on a low, sandy island in the Senegal River, about 11 miles above its entrance into the Atlantic Ocean, and 162 miles by rail northeast of Dakar. Only the right channel of the river and a narrow tongue of sand dunes, about 500 feet wide at this point, separate it from the open sea. It is connected by bridges with villages on both sides of the river, and is served by modern means of communication. Steamers may proceed up the river to Podor, 140 miles distant, throughout the year, and as far as Kayes during the flood season, from July to October. The commerce of the city is chiefly with other centers along the river, and with Dakar, and metropolitan France. Among the principal buildings in St.-Louis are the colonial administrative building, the military barracks, a military hospital, a mosque, and a Roman Catholic Church. Public works have done much to improve the once unhealthful living conditions.

St.-Louis was founded in 1658 by a group of French merchant traders organized as the Compagnie Normande. It was seized by the British with the colony of Senegal in 1758, restored to the French in 1779, and again taken by the British in 1809. It was returned permanently to France in 1817. With the appointment in 1854 of Gen. Louis León César Faidherbe (q.v.) as governor general of the colony, there began the modern development of the city, which continued steadily thereafter. In 1948 the population was estimated at 51,000.

SAINT LOUIS, Fort, Ill., a crude enclosure built in the winter of 1682–1683 by René Robert Cavalier, Sieur de La Salle (q.v.) and his lieutenant, Henri de Tonty, for the protection of La Salle's projected Illinois colony. Erected on Starved Rock, which rises almost sheer for 125 feet from the south bank of the Illinois River not far from the present city of Ottawa, La Salle County, the fort was largely abandoned after Fort Pimitoui was built at what is now Peoria in 1691–1692, although it continued to be used occasionally by Tonty and others for several years. By 1699, however, it was entirely deserted and

later fell into ruins. The site is now included in Starved Rock State Park.

SAINT LOUIS, Fort, Texas, built by René Robert Cavalier, Sieur de La Salle, a few miles above the mouth of what he called the Lavaca River, now Garcitas Creek, after landing in 1685 with a group of French colonists on the shore of Matagorda Bay, which he believed to be the western mouth of the Mississippi River. The fort consisted of one large building and several smaller ones. From here La Salle, who soon discovered his false identification of the place, made several vain attempts to find the Mississippi and to reach Canada. Meanwhile the plight of the colonists grew steadily worse, their number being reduced by death and desertion from approximately 180 to 45 by January 1667, when La Salle set out with half the remainder in a final effort to reach Canada. Most of those left at the fort were killed by Indians early in 1689, and three months later the ruins of the settlement were discovered by a Spanish expedition, led by Alonso de León, sent in quest of La Salle. In the following year de León returned to the fort and burned the buildings.

SAINT LOUIS, Order of. See ORDERS AND DECORATIONS—*France.*

SAINT LOUIS PARK, village, Minnesota; a suburb of Minneapolis; served by the Chicago, Milwaukee, St. Paul and Pacific, the Minneapolis and St. Louis, the Great Northern, and the Minneapolis-Northfield, and Southern railways, and state highways. The village is mainly residential. Industries include the making of ice cream, tools, and dental supplies. Government is by a mayor and council. Pop. (1950) 22,644.

SAINT LOUIS-SAN FRANCISCO RAILWAY (popularly known as FRISCO). During the 1840's there was much discussion of the possibility of connecting the Mississippi River by rail to the Pacific coast, and in 1849 the Missouri Legislature granted a charter for the construction of the Pacific Railroad westward from St. Louis. Work was started July 4, 1851, and on December 9 of that year the first train operating west of the Mississippi River left St. Louis. Progress on the road was slow, and in 1853 only 33 miles of line were in operation. In 1852 the Southwest Branch was chartered, and in December 1860 it was running 75 miles from Pacific (formerly Franklin), Mo., to Rolla, Mo. This branch was taken over by the Southwest Pacific Railroad in August 1866; in 1877 its capital stock was transferred to the Atlantic and Pacific Railroad, which constructed additional mileage. In 1868 the Atlantic and Pacific itself was acquired by the South Pacific Railroad, which continued construction of the new line. Then ownership was retransferred to the Atlantic and Pacific Railroad. By 1872 service extended across the Missouri line into Oklahoma. On Sept. 10, 1876, the St. Louis and San Francisco Railway Company was incorporated and took over the property of the Atlantic and Pacific Railroad. In 1893 this company passed into receivership; it was reorganized as of July 1, 1896 as the St. Louis and San Francisco Railroad Company. Subsequent expansions extended the service into Alabama, Arkansas, Florida, Kansas, Mississippi, Missouri, Oklahoma, Tennessee, and Texas. Putting aside the initial aspiration to reach the west coast, the road developed its system as a purely Southwestern carrier. Purchase in 1901 of the Kansas City, Fort Scott and Memphis Railroad with its subsidiary, the Kansas City, Memphis and Birmingham line, gave the system entrance into Alabama, and subsequently the line was extended to Columbus, Miss., and thence to Kimbrough, Ala., and in 1928 to Pensacola. Fla. In 1913 the St. Louis and San Francisco Railroad Company went into receivership and emerged in 1916 as the St. Louis-San Francisco Railway. This new corporation lasted until 1932, when the road again went into receivership. Another reorganization of the company was effected Jan. 1, 1947, under the same name. In 1948 the road acquired the 214-mile Alabama, Tennessee & Northern Railroad Company, which opened to it the port of Mobile, Ala.

The road operates approximately 5,000,000 passenger miles per year. Among its better-known luxury passenger trains are the streamlined, Diesel-powered *Texas Special,* operating between St. Louis and San Antonio via Dallas and Fort Worth, and the *Meteor,* operating between St. Louis and Oklahoma City via Tulsa. Its freight service includes several trains which operate on near-passenger train schedules and give overnight and one-day service. The majority of its freight tonnage consists of iron and steel, agricultural products, petroleum, and minerals, which move through its main terminals at Birmingham and Mobile, Ala.; Fort Smith, Ark.; Pensacola, Fla.; Kansas City and St. Louis, Mo.; Oklahoma City and Tulsa, Okla.; Memphis, Tenn.; and Fort Worth and Dallas, Texas. Its major operational terminal is in Springfield, Mo. Through its Dieselization program the road had in service early in 1950 the following Diesel equipment: 108 1,500-horsepower road freight units, 6 2,000-horsepower passenger units, 14 2,250-horsepower units, 20 1,500-horsepower all-purpose units, 75 1,000-horsepower switching units, 2 660-horsepower switching units, and 8 44-ton switching units. Including the Alabama, Tennessee & Northern Railroad, the road operated over 5,138 miles in 1950.

CLARK HUNGERFORD,
President.

SAINT LOUIS UNIVERSITY, St. Louis, Mo., founded in 1818 as St. Louis Academy by the Rt. Rev. Louis William Du Bourg, bishop of Louisiana, became St. Louis College in 1820. During its first 10 years, it was a French-speaking school under the direction of the St. Louis diocesan clergy. In 1828 it passed to the jurisdiction of the Jesuit Fathers, who have operated it continuously since that time and as an English-speaking school. On Dec. 28, 1832, it was granted a university charter. Before 1850 it had established its Graduate (1832), Divinity (1834), Medicine (1836), and Law (1842) schools. As early as 1836, it had a department of fine arts. The School of Law was discontinued in 1847. The second half of the 19th century saw further retrenchments due in part to external causes. When the Know-Nothing Party (q.v.) swept the central states it was deemed advisable in 1855 to close the School of Medicine. The School of Divinity was discontinued in 1860.

The approach of the 20th century, however, saw a resurgence which has continued to the

present day. The School of Philosophy and Science was founded in 1889. The School of Divinity was reopened in 1899. In 1903, St. Louis University acquired the Marion-Sims-Beaumont College of Medicine, its present School of Medicine. In 1908, St. Louis Dental College became an integral part of the university. The School of Law was reopened in 1908. In 1910 the School of Commerce and Finance was founded. In 1925, St. Louis University became the first institution of higher learning in the world to establish a department of geophysics, which grew out of its geophysical laboratory, established in 1909. The corporate colleges of St. Louis University—Fontbonne, Maryville, Webster, St. Mary's Junior College, and Notre Dame Junior College—merged with the university in 1926. The School of Nursing, as such, was organized in 1928. The School of Social Service, established as the School of Sociology, assumed its present title in 1933, and in 1936 became a graduate school. In 1942, the Labor College was opened. The Institute of Social Sciences, a cooperative undertaking of all Jesuit institutions in the United States, was established at St. Louis University in 1944. Also in 1944 was established the Institute of Technology, and in 1946 the university obtained by gift Parks College of Aeronautical Technology, founded in 1927 as the first federally approved aviation school in the nation. The university radio station, WEW, which traces its broadcasting activities back to 1912, was the second station to be licensed in the United States and the first station in the world to be operated by a university.

St. Louis University operates the largest Roman Catholic medical center in the world, and is the second oldest Roman Catholic university in the United States, antedated only by Georgetown University (q.v.). Its faculty numbers 1,100. Enrollment for 1949–1950 totaled more than 9,300. Its graduates for the same period totaled 2,045, with 46 different kinds of degrees granted. Students of all races are admitted, and, though a Roman Catholic institution, the university is open to men and women of every creed. Of its 1949–1950 students, about one fourth were not of the Roman Catholic faith. The university's grounds, buildings, and equipment are valued (1950) at $10,000,000. Income for the 1948–1949 period amounted to $4,400,000 exclusive of gifts, which aggregated $300,000. The university is endowed to the amount of $3,000,000.

JOHN J. MCCARTHY,
Director of Public Information, St. Louis University.

SAINT LOUIS WORLD'S FAIR. See LOUISIANA PURCHASE EXPOSITION.

SAINT LUCIA, lū'shà, or lū-sē'à, the largest and most picturesque of the Windward Islands, British West Indies. It is situated at latitude 13°54′N., and longitude 60°59′W., 24 miles south of Martinique and 21 miles northeast of St. Vincent. The island is 27 miles long, 14 miles wide, and 233 square miles in area. The terrain is largely mountainous, the highest point, Mount Canaries, reaching 3,145 feet above sea level, and is covered with tropical vegetation and forest growths. There are fertile valleys, however, and approximately one third of the area is cultivated. Among the striking natural features are the twin peaks known as the Pitons, which rise abruptly from the sea just below Soufrière Bay, Gros Piton to a height of 2,619 feet and Petit Piton to 2,461 feet. Near Soufrière are boiling sulphur springs, from which the town derives its name. The climate is tropical. The chief towns are Castries, the capital, on the northwest coast, which has a fine landlocked harbor and a population of 15,000 (estimated 1949); and Soufrière, some 12 miles to the south. In 1948 four fifths of Castries was destroyed by fire; the British government made a grant for its rebuilding. There are 557 miles of roads, of which 200 miles are usable in all weathers.

The principal industry is agriculture, the staple crops being sugarcane, coconuts, limes, cacao, and bananas. Other products are vegetables, fruits, spices, honey, bay oil, bay rum, cotton, and wood. A variety of fish are caught for the local market.

The chief executive is the administrator, who is subordinate to the governor of the Windward Islands. He is assisted by a nominated Executive Council, and an 11-member Legislative Council, 3 of whose members are officials, 3 nominated, and 5 elected. In 1947–1948 there were 45 government-supported elementary schools, of which 39 were conducted by the Roman Catholic Church, 3 by the Anglicans, and 3 by the Methodists; their total enrollment was 10,997. In addition, there were 2 Roman Catholic and 2 private secondary schools. Three additional schools were under construction in 1949.

History.—The island was probably discovered by Christopher Columbus in 1502, and named in honor of St. Lucia. Later claimed by the French, it was settled by the English in 1639. In the following year, however, this colony was wiped out by the native Caribs. Thereafter St. Lucia was the scene of bitter conflicts between France and Great Britain, being held alternately by each nation at various times until 1803, when it became a permanent British possession. In the development of the island French influence has been strong. A French patois is still spoken to some extent, and most of the people are Roman Catholics. The population, estimated to number 81,143 in 1949, consists largely of Negroes. The white population is mostly of French creole origin.

In 1940 the United States leased from the British government several sites on the island for air and naval bases; that at Vieux Fort was returned to civilian control in 1949.

SAINT LUCIE INLET, Fla., at the southern end of the Indian River, is the eastern terminus of the St. Lucie Canal, which was laid out before 1860 in order to reduce the number of losses of vessels rounding Florida, which totaled 500 between 1848 and 1857. This canal is a link in the Cross-Florida Waterway and extends from Stuart on the Atlantic coast to Lake Okeechobee. Boats not exceeding a draft of 6 feet pass from the canal into the lake, from which they proceed by lock into Lake Hicpochee and then via the Caloosahatchee River into the Gulf of Mexico.

SAINT LUKE, Guilds of, associations of painters organized in medieval times under the patronage of St. Luke. The guilds flourished for many years in the Netherlands and admitted as members engravers, printers, and other groups.

SAINT-MALO, săn-mà-lō', France, in the Department of Ille-et-Vilaine, at the mouth of

the Rance, on the English Channel, occupies a rocky island, 47 miles northwest of Rennes. It is connected with the mainland by a causeway called Le Sillon. Ancient towered ramparts, with eight gates, surround the town. A castle, built in the 14th–15th centuries, is used as barracks. The harbor affords a total quayage of more than two miles.

Manufactures include hosiery, nets, sailcloth, and cordage. The Newfoundland cod fishery provides employment for many of the inhabitants. Cattle, fruit, and vegetables are exported, principally to Great Britain. François René de Chateaubriand was a native of Saint-Malo. Pop. (1946) 10,873.

SAINT MARC, săn-märk′, Haiti, town on Saint Marc's Bay, on the west coast, 44 miles northwest of Port-au-Prince. Near the town is a headland known as Crête à Pierrot, which was strongly fortified by English engineers and occupied by native soldiers in the war of independence, who here made a strong resistance against the French. It is the shipping port for a fertile valley, and exports chiefly coffee and logwood; the town also contains several distilleries. Pop. (1950) 10,485.

SAINT-MARC GIRARDIN, săn-märk′ zhē-rär-dăn′, **François Auguste** (originally, Marc Girardin), French politician and author: b. Paris, Feb. 22, 1801; d. Morsang-sur-Seine, April 1, 1873. He was educated at the Collège Napoléon and at the Collège Henri IV, and in 1828 commenced to contribute political articles to the *Journal des Débats.* In 1834 he was appointed professor of poetry at the Sorbonne, having exchanged it for that of history, held for a short time previously. Lectures which he gave at the Sorbonne were republished under the title *Cours de Littérature Dramatique* (1843–1863).

From 1835 to the revolution of 1848 he served as a member of the Chamber of Deputies. In 1844 he was elected to the French Academy. Other writings included *La Fontaine and the Fabulists* (1867); *Jean Jacques Rousseau, His Life and Works* (1875).

SAINT MARK'S CHURCH (San Marco). See Venice.

ST. MARK'S SCHOOL, a secondary boarding school for boys located in Southborough, Worcester County, Mass.; it was founded in 1865 by Joseph Burnett as a church school to conform with the principles and spirit of the Episcopal Church. Boys attend a short daily service in the school chapel, and a Sunday service at the parish church. The course of study aims at sound training in fields necessary for admission to colleges and scientific schools. There are six forms, corresponding to the 7th and 8th grades and the four years of high school. Boys are admitted in any of the five lower forms on the basis of test results and previous school records. A limited number of competitive scholarships are awarded annually. The school accommodates 190 boarding students and employs a faculty of 27, including a resident school physician. Older boys participate in the responsibility of running the school by serving on the student council and acting as monitors in charge of dormitories, study halls, and the work program. St. Mark's is incorporated not for profit, and is managed by the headmaster for a self-perpetuating board of trustees, of which the bishop of the diocese of Massachusetts is president. The land and buildings are valued at $550,000; there is an endowment in productive funds of approximately $1,500,000.

SAINT-MARTIN, săn-mär-tăn′, **Louis Claude de,** French mystic philosopher: b. Amboise, Jan. 18, 1743; d. Aunay, Oct. 23, 1803. While performing his military service he came under the influence of Martinez Pasqualis (1715?–1779), the Portuguese mystic, and expressed his views of that period in *Des erreurs et de la vérité* (1775), a work which the Roman Catholic Church placed upon the Index. Subsequently he traveled through Germany, England, Switzerland, and Italy, making converts to his own mystical philosophy, which was derived from a study of the works of Jakob Böhme (q.v.). He was styled "le philosophe inconnu." His followers, who called themselves Martinists, held that man on one side of his nature was a type of the Universe, a microcosm; on the other, the thought and reflection of God. By introspection, they held, all knowledge and wisdom could be reached. Other works included *L'homme de désir* (1790); *Le Nouvel Homme* (1792); *De l'esprit des choses* (1800). His *Oeuvres posthumes* appeared in 1807.

SAINT MARTIN, sânt mär′tĭn, island of the Lesser Antilles, northeast West Indies, east of Puerto Rico. The northern portion (area, 20 square miles; pop. 6,450) is part of the French overseas department of Guadeloupe; the northern portion (area, 13 square miles; pop. 1,609) is within the Netherlands Antilles. In the French portion, a foundation of old volcanic rocks has been partly overlaid with calcareous deposits, while in the Dutch portion volcanic rocks predominate. The highest point, 1,266 feet, is in the interior, on the boundary between the two sovereignties. There are sugarcane plantations, rum is manufactured, and salt obtained from the sea. Le Marigot is the capital of the French portion, and Philippsburg that of the Dutch portion. The island was settled in 1638 by the French and Dutch, but two years later they were driven out by the Spanish. In 1648 the French and Dutch regained possession and divided the island peaceably between them.

SAINT MARTIN'S DAY. See Martin I, Saint.

SAINT MARY HALL, Oxford University, originally was the parsonage of the rectors of Saint Mary's Church until it was presented by Edward II in 1326 to Oriel College. It then became a university hall and the office of principal was held by Oriel fellows down to 1656, from which time the chancellor exercised the right of nomination. In 1902 it was regularly incorporated with Oriel, in which its site, buildings, and property are now vested.

SAINT MARYLEBONE, mĕr′lĭ-bŏn, England, a metropolitan borough in the northwest of London, with an area of 1,473 acres. It is famous as the location of beautiful Regent's Park, which contains the Royal Botanical Gardens (18 acres) and the Zoological Gardens (34

acres), one of the largest zoos in the world. The Royal Academy of Music and the waxwork exhibition of Madame Tussaud (q.v.) are located on Marylebone Road, and the home of Elizabeth Barrett Browning (q.v.) was on Wimpole Street. Harley Street is the location of London's best-known surgeons, oculists, and dentists. Charles Dickens was living on Devonshire Terrace when he wrote *David Copperfield* (q.v.) and *Martin Chuzzlewit.* The district on Baker Street where it is recorded that fictional Sherlock Holmes lived was bombed out during World War II. Also, the famous parish chapel, Old Marylebone Church, where Elizabeth Barrett and Robert Browning were married, was greatly damaged during World War II.

SAINT MARYS, Maryland, the first settlement made in the state. In 1634 Gov. Leonard Calvert in his ship, the *Ark,* sailed up the Potomac to Saint Marys River, bought land of the Indians and established a settlement near the mouth of the Saint Marys. A Jesuit mission was established; many of the settlers, however, were Protestants and absolute liberty of worship prevailed. Though Saint Marys was the capital of Maryland and for a number of years the only town in the province, it was never more than a small settlement. In 1694, after Maryland became a royal colony, the capital was moved to Annapolis and Saint Marys fell into decay.

SAINT MARYS, city, Ohio, in Auglaize County, situated 22 miles southwest of Lima at an altitude of 926 feet; it is served by the New York Central and the New York, Chicago and Saint Louis railroads. It is in an agricultural region, and there are woolen mills, paper mills, and furniture plants. The city is supplied with natural gas. Settled in 1795, possibly by Charles Murry, a treaty was signed here on Sept. 17, 1818, between representatives of the Ottawa, Shawnee, and Wyandot Indian tribes and Lewis Cass and Duncan McArthur. Saint Marys was incorporated in 1820 and became a city in June 1903. Pop. (1950) 6,268.

SAINT MARYS, town, Ontario, Canada, in Perth County, on the Thames River, 100 miles southwest of Toronto, on the Canadian National and Canadian Pacific railways. Manufactures include cement, flour, dairy supplies, pins and small machinery, lumber, grist, and textiles. Stone for the cement is quarried here. Pop. (1951) 3,995.

SAINT MARYS, borough, Pennsylvania, in Elk County, 210 miles northwest of Harrisburg at an altitude of 1,670 feet; it is served by the Pennsylvania Railroad. Coal is mined in the neighborhood, and products of carbon, clay, leather, wood, electronic components, and electric lighting elements are made here. The borough was settled in 1842 by a group of Germans, and it was incorporated in 1848. Pop. (1940) 7,653; (1950) 7,846.

SAINT MARYS, a river between Lake Superior and Lake Huron, 40 miles in length. It is divided by large islands into two main channels, which each expand at intervals to a width of 10 miles. A fall of 22 feet in the river at Sault Sainte Marie, the twin cities of Michigan, United States, and Ontario, Canada, was formerly an obstruction to navigation. Two canals with large locks have been constructed, one on the United States side of Saint Marys Falls, and the other on the Canadian side. The United States canal was opened in June 1855. It is now 1½ miles long, 100 feet wide at the bottom, and 20 feet deep. Hay Lake Channel, adjoining Saint Marys River below the falls, has shortened, by 11 miles, the passage from Huron to Superior. Navigation is closed by ice part of the year.

SAINT MARY'S CHURCH, Cavalry Engagement at. In the American Civil War, after the battle of Trevilian Station (q.v.) cavalry divisions of the Confederates under Wade Hampton and Fitzhugh Lee kept close to the Union forces of Gen. Philip Henry Sheridan, which were covering the movement of a train of 900 wagons. On June 24, 1864, Sheridan sent the division of Gen. David McMurtrie Gregg and two batteries to Saint Mary's Church to cover his exposed flank, and there he was attacked by Hampton and Lee. After a stubborn contest Gregg was forced to give way. Sheridan declared that this was done in some confusion, although no material was lost, but Gregg, however, asserted that though the contest was unequal he retired without confusion or disorder. Nevertheless, Gregg left his dead and wounded on the field, and Hampton pursued him to within 2½ miles of Charles City Court House. The Union loss as reported was 29 killed, 188 wounded, and 122 missing. The loss in Hampton's division was 6 killed and 59 wounded. Lee's loss was not reported.

SAINT MARY'S COLLEGE, located at Saint Marys, Marion County, Ky. It was founded in 1821 by the pastor of the Catholic settlement as Saint Mary's Seminary; in 1833 the Jesuits took exclusive control, and the name was changed to Saint Mary's College; in 1837 the college was legally incorporated. A college farm was conducted, and all students were required to work one day every week on the farm. In 1846 the Jesuits abandoned the control of the college, and in 1847 it was transferred to the charge of the secular clergy of the diocese of Louisville. Financial difficulties resulted in its being closed from 1869 to 1871, and in the latter year it was reopened under the charge of the Fathers of the Congregation of the Resurrection, a teaching order, and was later recognized as the official Roman Catholic college of the diocese of Louisville.

SAINT MARY'S SEMINARY, and UNIVERSITY, a Roman Catholic institution in Baltimore, Md.; opened Oct. 30, 1791. From the first the seminary has been in charge of the Society of Saint Sulpice, an organization founded by Father Olier, in 1642, for preparing young men for the priesthood. On the site of the present institution, when the Fathers purchased the place, was the well-known "One Mile Tavern." There were only five students in the school during the first three years, and in 1806 only 12 students. However, the school continued its work. For a time Saint Mary's College, Baltimore, and Mount Saint Mary's College, Emmitsburg, Maryland, were affiliated with the seminary. The latter thereafter ceased to be

affiliated with the two colleges. After 1804 the seminary was raised to university rank by legislative act, and is accredited to present the doctor of philosophy and equivalent degrees in the arts and sciences and in theology. The school admits only men who wish to study for the priesthood, and has about 800 students.

SAINT MAURICE, sânt mô'rĭs, river, Quebec, Canada, 325 miles long, flowing southeast from the Gouin Reservoir into the St. Lawrence River at Trois Rivières.

SAINT MICHAEL, village, Alaska, on St. Michael's Island off the southeastern shore of Norton Sound, latitude 63° 29′ N., longitude 162° 1′ W. Founded in 1831 as a trading post of the Russian-American Company, the settlement was a supply center and point of transshipment for Yukon River steamers, but its importance has declined. Pop. (1950) 157.

SAINT MICHAEL'S COLLEGE, Vermont, a nonsectarian institution of higher education for men, located at Winooski Park, three miles northeast of Burlington. The college, privately controlled by the Society of St. Edmund of the Roman Catholic Church, was opened in 1904, and offers degrees of bachelor and master in the arts and sciences and in education. The student body is under 1,000. The college is noted for its summer theater, which cooperates with the Boston Repertory Theatre and the Burlington broadcasting station in conducting a drama workshop, and for Freshman Orientation Week, when a counseling team of a layman and a priest are assigned to every 30 men.

SAINT MICHAEL'S MOUNT, island, England, in Cornwall, about a mile in circumference, one fourth mile from the mainland. The islet, formed by an isolated rock of conical shape over 200 feet high, is a vast mass of granite protruding through schistose rock. An old castle and church stand upon its summit, and a fishing village with a projecting harbor lies at its base. A causeway, passable only at low tide, connects the island with the mainland. During the Middle Ages the mount was both a popular place of pilgrimage and a fortress. Edward the Confessor (r. 1043–1066) founded on it a Benedictine priory, which he donated to the Abbey of Mont-Saint-Michel in Normandy, France, under whose jurisdiction the mount remained intermittently until the dissolution of alien houses in the reign of Henry V. Under Henry VIII the island passed from religious to secular control. Its possession was disputed during the Lancastrian and Parliamentary wars, and after 1659 it became a manorial residence.

SAINT MICHEL (also called SAINT MICHEL DE LAVAL), city, Québec, Canada, located in Montreal Island, immediately north of the city of Montreal. St. Michel, which forms part of the metropolitan area of Montreal, lies near the center of the island, and is predominantly residential. Pop. (1941) 2,956; (1951) 10,539.

SAINT-MIHIEL, săn-mē-yĕl′, town and commune, France, in the Department of Meuse, in the northeastern section, famous for its Benedictine abbey. The town, founded by the Gauls, was called Châtillon until the 8th century, when it adopted its present name from the abbey. It had a parliament in the 14th century and was judicial center of Lorraine. In the 16th century a brilliant artistic school developed under the sculptor Ligier Richier, earning St.-Mihiel the name of "the Florence of Lorraine." Destroyed in 1635 by Louis XIII after determinedly resisting his armies, the town was restored with the help of St. Vincent de Paul. The many monuments in the town date mostly from the 17th and 18th centuries.

Held by the Germans during most of World War I, St. Mihiel was the center of the "St. Mihiel salient" which was reduced in a battle on Sept. 12 and 13, 1918. Gen. John J. Pershing planned the action as the first mainly American offensive of the war, although it was under the nominal direction of General Pétain, French commander-in-chief. In the Allied army were about 500,000 Americans and about 100,000 French. About 60,000 Germans commanded by General Fuchs held strongly fortified positions. The offensive was a complete success, with all objectives taken in two days, along with 16,000 prisoners. At the time, the *Infantry Journal* reported that the most intense concentration of artillery fire in history, more than 1,000,000 shells in four hours, had been employed. Outside of tactical and strategic considerations, the victory had some propaganda effect on the course of the war, since it was won by troops whom the enemy had derogated as inexperienced. Pop. commune (1954) 5,035.

SAINT MORITZ, sânt mô-rĭts′ (Ger. SANKT MORITZ; Romansh, SAN MUREZZAN), commune, Switzerland, health and mountain resort in Upper Engadine, canton of Graubünden, in the eastern part of the country. The commune consists of St. Moritz-Dorf (village, 6,080 feet), and St. Moritz-Bad (baths, 5,824 feet), where the chalybeate springs are located. The springs, known to the Romans, were recommended by Philippus Aureolus Paracelsus in 1537. St. Moritz is winter-sports capital of Switzerland. Pop. (1950) 2,558.

SAINT-NAZAIRE, săn-nà-zâr′, town and commune, France, in the Department of Loire-Inférieure, at the mouth of the Loire River, about 37 miles northwest of Nantes. The town is an important Atlantic seaport, maintaining trade with England, Spain, the two Americas, and West Africa. The well-equipped docks extend about three miles and can accommodate the largest vessels. St.-Nazaire is a major manufacturing and metallurgical center, and has large forges, foundries, refrigerating plants, and grain elevators. Before World War II the largest shipyards in France were located here. Thought to be located on the site of an old Gallo-Roman seaport named Corbilo, the town did not develop commercially until the later 19th century. During World War I the wharves were greatly enlarged to permit American and British forces to land. In 1940 during World War II the Germans turned the town into an important military and submarine base. It became the target for intensive Allied bombing and was completely destroyed before the German garrison surrendered in May 1945. By 1948 the shipyards were again in operation. Of special interest in the town is an ancient granite dolmen, 10 feet long resting horizontally on two stones seven feet from the ground. Pop. commune (1954) 39,350.

ST. OLAF COLLEGE. A coeducational college of arts and sciences located at Northfield, Minnesota, affiliated with the Evangelical Lutheran Church of America but privately controlled. College was founded in 1874 chiefly through the efforts of the Rev. Bernt Julius Muus, a prominent pioneer pastor in Goodhue and Rice counties, Minnesota. It was known as St. Olaf's School from 1874 to 1886 during which time its educational status was that of an academy. The college division was established in 1886 and its first class graduated in 1890. The academy division was discontinued in 1917 because of the rigid expansion of the college and the corresponding development of public secondary schools. From its origin to the present time it has been affiliated with or operated by the various Lutheran Church groups which now constitute the Evangelical Lutheran Church of America.

As a standard liberal arts college it aims to provide an academic training which is fully abreast of the best quality scholarship and to furnish the facilities for study, teaching, and research which will make possible an efficient and progressive academic life. As a college of the Lutheran Church, it is loyal to the beliefs and practices of this church. It seeks to train students for constructive service in many important fields of Christian activity within the church as well as in the world at large.

The College offers majors toward a bachelor of arts degree or a bachelor of music degree in twenty-three academic fields. It has established excellent pre-professional training programs in special areas as theology, medicine, law, and engineering. In 1948 its instructional staff numbered 123; its administrative staff 93. Its enrollment in 1948 is 1,708 students.

The College is accredited by the North Central Association of Colleges and Secondary Schools, the Association of American Universities, the American Association of University Women, and the American Chemical Society.

The Ole E. Rölvaag Library, named in honor of the college's distinguished author-son, has an ultimate stack capacity of 200,000 volumes. The library at the present time numbers about 73,893 volumes, including 6,000 volumes of bound periodicals. The Carnegie Corporation has given collections of books on music and art. The archives of the Norwegian-American Historical Association are located in this building.

In 1948 its endowments totaled $1,100,000.

SAINT OMER, săn-tô-mar′, France, a fortified city in the department Pas-de-Calais, 26 miles southeast of Calais, on the Aa River. It is situated on a marshy site, has two harbors and begins the canalized portion of the Aa. The Gothic cathedral is old and curious. It has fine portals (13th–14th centuries), good paintings, interesting statues and monuments, wood carvings and fine stained glass and mosaics. The other notable points of interest are the ruined tower and arches of the Benedictine Abbey of Saint Bertin and a museum. The Church of Saint Sepulchre is remarkable for its beautiful stone spire and stained glass windows. The town hall contains valuable records, a picture gallery and a theater. There is a large public library and extensive arsenal. Saint Omer manufactures tobacco pipes, cloth, hosiery, tulle, cambric and muslin embroideries. Its trade is in these articles and in paper, flour, sugar, beer and other liquors. During World War I it was for a time General Headquarters of the British Army in France. Pop. (1946) 18,373.

SAINT-OUEN, săn-twăn′, France, a suburb of Paris, in the Department of the Seine, about one mile southwest of Saint Denis, is an important manufacturing center and river-port, with spacious docks. The industrial establishments include foundries, forges, machine and glass works, sugar and sawmills and manufactories of rubber-goods, varnish, printer's ink, canned foods and firearms. Here on May 2, 1814, Louis XVIII signed a promise for a constitutional charter for France. Pop. (1946) 51,106.

SAINT OURS, săn-tōōrz′, Jean Baptiste de, Sieur D'Eschaillons, French-Canadian soldier: b. Canada, 1668; d. Montreal, 1747. His father, Pierre de Saint Ours, was the first of the family to come to Canada, and obtained extensive grants of land. The son entered the army at an early age and in 1702 was made lieutenant. He was one of the commanders of the expedition against Fort Orange (Albany) in 1708. He commanded a company in de Ramezay's expedition against the English in 1710, and in 1721 was sent on a special mission to several Indian tribes by the governor, De Vaudreuil. On this expedition Saint Ours endeavored to put a stop to the liquor traffic with the Miamis, and tried to bring about peace between the Sioux and their enemies; also induced the Creeks to form a single village. On his return he subsequently became king's lieutenant of Montreal.

SAINT PANCRAS, sânt păng′krăs, England, a metropolitan and Parliamentary borough of London, lying east and north of Regent's Park; area, 4.21 square miles. It is well supplied with open spaces, which include Parliament Hill and Primrose Hill. The railway terminals of Saint Pancras, King's Cross and Euston Square are within the borough. It returns four members to Parliament. Pop. (1945) 121,150.

SAINT PATRICK'S COLLEGE, a theological school in Maynooth, Ireland, popularly known as Maynooth College. It was founded in 1795 and the Gothic building was erected by a parliamentary grant obtained in 1846. The college is now affiliated with the National University of Ireland.

SAINT PAUL, the Apostle to the Gentiles. According to Acts 21:39 Paul was a native of Tarsus, the most important city of Cilicia. His parents were of pure Jewish descent, for he could boast that he was "of the stock of Israel, of the tribe of Benjamin, a Hebrew of the Hebrews" (Philippians 3:5). His father, however, was a Roman citizen. How he had acquired this privilege we are not told. It may have been purchased or obtained in some other way. Paul was content to say that *he* was free-born. Tarsus was a center of Greek culture and the son of a citizen of that town had ample opportunities to secure the best classical education the times afforded. To what extent Paul shared these advantages is not stated, but his words (Acts 22:3) appear to mean that at a comparatively early age he was sent to Jerusalem

to receive a *Jewish* rather than a Greek education. The social status of Paul's parents may have been high. There are good reasons for thinking that the family was wealthy. (Consult Ramsay, 'Saint Paul the Traveller,' etc., pp. 310 ff). However, this did not interfere with the good Jewish custom of teaching the boy a trade. That he learned to make tents was the more natural since the wool of the long-haired Cilician goats was extensively used for tent-cloth. It is probable that he learned his handicraft before he went to Jerusalem for his education.

Like other individuals with two names in the New Testament he was more familiarly known in Jewish circles by his Hebrew name, Saul. Paul was his Roman name, the cognomen given him probably by his father, for what reason we do not know. As his life work developed and he felt himself called to minister to the great Gentile world he preferred his Roman-Greek name to the Hebrew one.

The date of Paul's birth cannot be fixed with exactness. In his letter to Philemon (9), written probably about 60 A.D., he calls himself an elderly man (*πρεσβύτης*). This may be taken as signifying, approximately, one who has attained his 60th year. Probably he was born within a very few years of the beginning of the Christian era.

His personal appearance was not imposing. His opponents could easily admit that his letters were powerful and at the same time remark that "his bodily presence was weak and his speech contemptible" (2 Cor. x, 10). A very ancient tradition in Asia Minor speaks of him as "baldheaded, bow-legged, strongly built, a man small in size, with meeting eyebrows, a rather large nose, full of grace, for at times he looked like a man and at times he had the face of an angel." (Consult Ramsey, 'The Church and the Roman Empire,' ch. xvi). Behind such an unattractive exterior lay a physical nature capable of enduring the severest strains (see 2 Cor. xi, 23–28) and a soul endowed with most varied gifts in rich abundance.

To the young Jew of Tarsus the opportunity to study in Jerusalem at the feet of Gamaliel (Acts xxii, 3), one of the most learned rabbis of his day, was a privilege to be used to the utmost, no mere parent-imposed task. Proud of his Pharisaic ancestry and training the young man eagerly pursued his studies "advancing in Judaism beyond many" of his associates, "being more exceedingly zealous for the traditions" (Gal. i, 14). He studied the Old Testament and especially the Law not merely as the authorities for the national religion or for orthodox Pharisaic theology, but as the foundation and source of his personal religion. He was anxious to attain the righteousness demanded by the Law. So far as externals went he succeeded in doing this (Phil. iii, 6). But the more thoroughly he probed his religious experience the more hopeless his case seemed. The sentence of the Law became to his sensitive conscience the sentence of death (Rom. vii, 7–25).

It was while Paul was thus pursuing his studies in the rabbinic schools that Jesus the Messiah lived and died. Whether Paul was in Jerusalem on any of the occasions when Jesus visited the place, or whether he ever saw Jesus in the flesh is doubtful. (2 Cor. v, 16 does not necessarily imply this). However that may have been, Paul's opposition to Christianity did not begin with the first Christian preaching. Not until the early Church had become well started, when such a teacher as Stephen began to declare the merely temporal character of Jewish ordinances, was Paul's opposition aroused. We meet him first in the record of the martyrdom of Stephen at which the witnesses laid down their garments (Acts vii, 58, cf. Deut. xvii, 7) "at the feet of a young man named Saul, who was consenting to his death" (Acts vii, 58, viii, 1). Though too young to have been a member of the Sanhedrin (Acts xxvi, 10 does not mean this) he stood high in the favor of the Jewish authorities and was only too willing to take the lead in a general persecution of all Christians in Palestine and adjacent lands. After having caused the imprisonment of many in and about Jerusalem, some of whom were put to death, while others suffered great indignities (Acts xxvi, 10–11, xxii, 19, ix, 1, Gal. i, 23), he secured authority from the chief priests to proceed to Damascus and take action against any Christians he might find there (Acts ix, 1, xxii, 5, xxvi, 12).

But Paul was not to enter Damascus as a persecutor. As he and his party neared the city a sudden and most profound transformation took place. Paul had a vision, in which he saw Jesus the Nazarene and heard Him ask "Saul, Saul, why persecutest thou me?" (cf. Acts, ch. ix, xxii and xxvi, and also Gal. i, 15, 1 Cor. ix, 1, xv, 8). It was enough. Henceforth Paul's entire point of view was changed. God had "revealed His Son" in him. He had seen Jesus as *Lord*. It meant parting with all his past, though as yet he saw this only as to some main points. Above all, it revolutionized his idea of Jesus. That one had been to him only the justly crucified leader of a heretical movement. He was now and evermore the glorified Messiah. Accepted as a brother by the believers in Damascus, Paul soon began to proclaim Jesus as the Messiah to the Jews there. This only aroused their hostility and they plotted to get him in their possession. He succeeded in escaping (Acts ix, 25, 2 Cor. xi, 32) and made his way into Arabia (Gal. i, 17) where he stayed for upward of three years, not "conversing with flesh and blood," that is, not seeking light or instruction from those who had been Christians before him, but in meditation and communion with God, seeking to sound the depths of that great revelation that had been granted him. What struggles and conflicts he then went through, what changes of view on many details of his Jewish belief, what great revolutions of opinion, what new-found hopes and convictions he now experienced — we can see all these reflected in his later speeches and letters. Finally he was able to outline the main points involved in his new faith. That Jesus of Nazareth was and is the Son of God, that in His death forgiveness of sin is made possible, and that through faith in Him forgiveness and salvation are made a personal possession,— these formed the core of his gospel of the cross, a gospel that no man taught him, but which came to him from God (Gal. i, 11).

He was now ready to learn details about Jesus' earthly life and ministry. He, therefore, returned to Damascus and then visited Jerusalem especially to talk with Peter. Having gained what he desired from Peter and by his

preaching having aroused the opposition of his former associates in Judaism, he soon left Jerusalem and went into «Syria and Cilicia» (Gal. i, 21; cf. Acts ix, 30). After some years' labor in these regions, he was sought out by Barnabas and persuaded to join that good man in the work of building up the new church at Antioch, the metropolis of Syria. This church had almost from the first considered Gentiles as worthy to be approached directly with the Gospel message. In such an atmosphere Paul's own view of the Gospel as suited for man as man independent of his antecedents found room for full expression. After laboring here for a year Paul, with Barnabas, was delegated to carry an offering from the church at Antioch to the mother church at Jerusalem (Acts xi, 27–30, xii, 25). Since Paul makes no mention of this visit in his survey of his connection with the mother church in Galatians i and ii, it is probable that it was of no special importance to Paul personally. Returning to Antioch accompanied by John Mark of Jerusalem, Barnabas' cousin, it was soon decided to organize a mission to the adjacent lands. At a meeting of the church Barnabas and Paul were formally set apart to this work through prayer and laying on of hands (Acts xiii, 1–3).

Taking with them John Mark as assistant, the two set out on the First Missionary Journey (Acts xiii, 4–xiv, 28). Cyprus was first visited and traversed from end to end, then crossing the sea to the mainland they disembarked at Perga of Pamphylia. Here they decided to strike inland. For some reason Mark deserted them now and returned to Jerusalem. From Perga they proceeded to Antioch of Pisidia. At this important centre of trade the missionaries stopped. Paul delivered an address in the Jewish synagogue, in which he sought to convince them that Jesus was indeed the Messiah promised in the Scriptures. So great was the interest aroused that a second address was asked for the following Sabbath. At this meeting the majority in the synagogue refused to accept the message and the missionaries then turned their attention to the Gentiles. A Christian Church was soon organized in which naturally Gentiles and Jews met on equal terms. The work grew rapidly but the opposition of the Jews of the synagogue became so bitter that Paul and Barnabas thought it best to leave. From Antioch they proceeded eastward to Iconium, where they met with much the same experience. From Iconium they went on to Lystra and thence to Derbe. At Lystra, the home of the future disciple, Timothy, the healing of a cripple led the pagan multitude to think that the gods were again visiting the earth. All these towns were on a great commercial highway leading through southern Asia Minor from Asia to Europe and, though originally belonging to different nations, were then all included in the great province of Galatia. Consequently the churches founded on this journey may be those to whom the apostle addressed the Epistle to the Galatians (q.v.). From Derbe the missionaries retraced their steps and arriving at the coast sailed directly to Antioch without revisiting Cyprus. The journey, which probably covered about a year and a half, had been a complete success. It proved how the Gospel was capable of being applied to and understood by the pagan world.

Just at this time extremely conservative Jewish Christians from Jerusalem disturbed the peace of the Antioch Church by teaching, as the orthodox view, that Gentiles, in order to be saved, must not only profess faith in Jesus Christ and be baptized, but also be circumcised and obligate themselves to keep the Jewish law. What part Paul took in the discussion at Antioch we do not know, but so serious was the situation seen to be that the church decided to refer the matter to the apostolic body at Jerusalem and delegated Barnabas and Paul to represent them at the council so summoned.

The probable date of the Apostolic Council was 49 A.D. or possibly 48. If Paul counts the «fourteen years» of Gal. ii, 1 from his conversion, then that event took place somewhere near 35 A.D. If the 14 years is to be counted from his visit to Jerusalem to see Peter (Gal. i, 18) then his conversion must have been as early as about 32–33 A.D. The report of the council in Acts xv needs to be supplemented by Paul's own statements in Gal. ii, 1–10. The result was a victory for Paul, at least to this extent, that the mother church put itself on record as recognizing the legitimacy of the Gentile Christian movement and refused to order that Gentile Christians should be circumcised. To Paul himself was given full recognition of his Apostolic status.

Soon after their return to Antioch, Paul proposed to Barnabas that they revisit their churches in Galatia. Barnabas wished to take Mark. Paul would not consent to this since Mark had deserted them on the first journey. The contention was sharp and the two friends separated. Paul now set out with Silas (Silvanus) as his companion on his Second Missionary Journey (Acts xv, 40-xviii, 22, 49–51 A.D.). Entering Asia Minor through the Cilician gates, in due time they arrived at Derbe and Lystra. Here they were joined by Timothy, a choice young convert. After spending some time with the churches organized on the first journey, they moved on through Asia Minor, perhaps founding some new churches in Galatia (see GALATIANS, EPISTLE TO), and finally arrived at Troas, where, possibly, Paul met Luke. The «we» sections of Acts begin at this point (Acts xvi, 10). Here the night vision of a Macedonian man calling for help convinced Paul that the Gospel must be carried into Europe. Crossing over to Macedonia, at Philippi, at Thessalonica and at Berœa, all Macedonian towns, Paul succeeded in organizing churches. His method was essentially the same in all cases,— first to address the Jewish inhabitants at their synagogue or other meetings, and then, when hostility manifested itself, to withdraw his adherents from the synagogue and organize a church of the free Gentile Christian order. The discontented Jewish element followed him with dangerous persecution and it was to avoid falling into their hands that he left Berœa hastily and went on to Athens. Here apparently was an uninviting field. The city of philosophers and idlers was not thirsting for the Gospel of Paul. But in spite of misgivings he delivered his famous address on Mars Hill. Perhaps nowhere does Paul's versatility and breadth of view, his profound conception of the universal character of the Gos-

pel message show itself as it does here in this address. But Athens was not prepared for such a message and as soon as his helpers arrived from Macedonia with the report of the conditions there he sent Timothy back to Thessalonica (1 Thess. iii, 1), while he himself (with Silas, see Acts xvii, 15 and xviii, 5) pushed on to Corinth. Making the acquaintance of Aquila and Priscilla, Jews lately banished from Rome, he joined them in working at the tent-maker's trade. At first he had little success, but the arrival of Timothy from Macedonia with news of the devotion and constancy of the disciples there stirred him to new efforts (cf. 1 Cor. ii, 1 ff; 1 Thess. iii, 1–6; Acts xviii, 1–8). For a year and a half Paul was busy at Corinth. To organize and build up a Christian community in that large, gay, wicked, commercial metropolis was no easy task. It was while here that he wrote his two letters to the church of Thessalonica. The first one was occasioned by Timothy's arrival with good news and is full of words of commendation and hope. The second was written to counteract certain wrong views or inferences, mainly of statements in the first letter. These epistles, perhaps the earliest of the New Testament books, show us the Apostle's mind before the great doctrinal conflicts of the next few years had engaged his attention. The long stay in Corinth was perhaps shortened by the unsuccessful attempt of the Jews to have him tried by Gallio, the Roman pro-consul. Though this came to nothing Paul seems to have left Corinth soon after (fall of 51 A.D.) and crossing over to Ephesus with Aquila and Priscilla he hastened on to Antioch (Acts xviii, 18–22).

His stay in Antioch was not a long one. He soon found himself on his Third Missionary Journey (Acts xviii, 23–xxi, 17, fall of 51 to spring of 55 A.D.). Rapidly going through his old field in Galatia he arrived at Ephesus, then the great commercial emporium of Asia Minor. Here for nearly three years he made his headquarters. For Paul this was a period of most intense activity. Ephesus was a meeting place for all sorts of philosophical and religious speculations. As the patron city of the worship of the great goddess Artemis (Diana) whose temple outside the city walls was one of the wonders of the world, it was a stronghold of paganism and superstition. It was an open door, "but there were many adversaries" (1 Cor. xvi, 9). But it was not alone in Ephesus that "adversaries" were opposing the Apostle. In his old churches in Galatia and in Corinth enemies were sowing seeds of discord. The mischief-makers were members of the extreme Judaistic party, whose opposition to Paul's Gentile Christianity had necessitated the council at Jerusalem in 49 A.D. Only apparently defeated there they determined to carry the conflict into the churches founded by Paul himself. Their arguments were, mainly, that Paul was only a secondary apostle, not one of the original 12, that his gospel was, therefore, only one derived by false reasoning from the normal gospel of Judaistic Christianity, and that Paul's principles practically made the whole Old Testament, especially the Law, of no character or value whatsoever. Only too many in Paul's own churches were ready to listen to such teaching. From Galatia and from Corinth there came news to Ephesus of factious strife, of the adoption of Jewish customs and of growing hostility to himself on the part of those he had taught and trusted. But Paul, though bitterly disappointed and sorely tried, was equal to the emergency. In the Epistles to the Galatians and Corinthians he tried to deal with these vexatious and difficult problems. In them he successfully met the points raised by his assailants and, at least in the case of the church of Corinth, succeeded in winning the church back to himself. For the details of these matters readers are referred to special articles on these Epistles. During his sojourn at Ephesus "all Asia" (Acts xix, 10) had the advantage of Paul's missionary activity. Not long after the tumult caused by Demetrius the silversmith (xix, 23–41) he set out for Corinth, but, uncertain of the reception accorded to his first letter (1 Corinthians) and subsequent messages, he took the indirect route via Troas and Macedonia. In Macedonia Titus came from Corinth with most encouraging news (2 Cor. vii, 5–7) and Paul gladly pushed on to revisit the Corinthian church. He stayed at Corinth during the winter of 54–55 A.D. Before leaving Greece for his long contemplated visit to Jerusalem he penned his most comprehensive and important epistle, to the Christians of Rome, in which he set forth the great fundamentals of the Christian theology and thus prepared them for the visit he had in mind to make them. (See ROMANS). Paul now hastened to Jerusalem, not stopping at Ephesus, but saying farewell to a delegation from that church that met him at Miletus.

At Jerusalem he presented the mother church with the great collection he had been gathering for some time and was cordially received by James and other leading members, but advised to give evidence to the Jewish Christians that he himself still followed the ancestral mode of life according to the Law (Acts xxi). Paul was willing to do this, but it brought him into conflict with certain fanatics who accused him of defiling the temple. These were not Jewish Christians, but Jews of Asia who knew of his work in Ephesus and were bitterly opposed to him. A great uproar followed in which Paul was nearly killed, and only rescued by the prompt action of the Roman captain who commanded the garrison of the castle of Antonia overlooking the temple. Paul's attempt to explain his position to the Jews only enraged them the more and soon after, convinced that plots were being laid against Paul, Lysias the Roman captain sent him under a strong guard to Felix, the governor of Palestine at Cæsarea. Although Felix soon discovered that Paul was not guilty of any serious offense, he kept him bound in easy confinement, partly from mercenary motives, until his recall about two years later (that is, about 57 A.D.). Felix was succeeded by Porcius Festus before whom Paul cut the whole matter short by appealing to the emperor (Acts xxv–xxvi).

Paul was sent to Rome at the first opportunity (57 A.D.). With other prisoners he experienced shipwreck near Malta and was compelled to remain there all winter. In the spring the voyage was resumed and in due time they arrived at Rome. Paul's resolution and courage had commended him to the centurion in charge during

the voyage, and he was in consequence treated leniently. Friends met them some miles outside of Rome. In the city, while awaiting the emperor's pleasure concerning his case, Paul was permitted to live in his own hired lodging and have free intercourse with any who might desire to see him. One of his first acts in Rome was to call the leading Jews of the city together and set before them the principles of Christianity. The result was, as usual, that some believed him; others did not. Luke says (Acts 28:30–31) that this Roman captivity lasted two years (58–60 A.D.). If it had ended with his execution it would probably have been so stated. The natural inference is that he was released at the end of that period. It was during his Roman imprisonment that he wrote the *Epistles of the Captivity,* that is Ephesians, Colossians, Philemon and, probably as the last, Philippians. In these epistles the controversies that raged in Asia and filled his mind when writing to the Galatians and Corinthians are no longer prominent. His mind is full of the thought of the Church of Christ, and of the great divine personality who is its head. It is in these beautiful epistles, especially in Philemon and Philippians, that the heart of Paul is seen as nowhere else except perhaps in II Corinthians. Some details as to Paul's experience in Rome may be gathered from Philemon and Philippians, not sufficient, however, to make a complete outline.

After his release (61 A.D.) Paul appears to have undertaken another missionary journey, possibly to Spain (Rom. 15:24, also the tradition in Clem. Rom.). He afterward revisited the East and while there (according to what seems the most probable theory) wrote I Timothy and Titus. Again arrested he was brought to Rome for a second trial. Before this took place he wrote a letter to Timothy (II Timothy) beseeching him to come to him as soon as possible. It was probably about 64 or 65 that the great Apostle was executed by command of Nero. (The points in this paragraph have been stated on the theory that the Pastoral Epistles are genuine Pauline letters.)

It is hard to estimate adequately the significance of such a life. More than any other one Paul made Christianity the world-religion. No other man has so profoundly influenced the religious thinking of mankind. He was the greatest man of the Apostolic Age, if not of all ages of the church. Yet he was ever the disciple and Jesus the Master.

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SAINT PAUL, a remarkable island in the Indian Ocean, half way between Africa and Australia, and about 50 miles south of the island of Amsterdam. These islands are the exact antithesis of each other, St. Paul almost barren and Amsterdam covered with a dense vegetation. The island is two miles long, the highest point about 860 feet high and of volcanic origin. Goats, cats, rats and mice flourish, insect life is abundant, and sea-fowl in multitudes are characteristic. The island is a dependency of Madagascar.

SAINT PAUL, city, Minnesota, capital of the state and seat of Ramsey County, is located in the southeastern part of Minnesota on the Mississippi River at an altitude of 680–1,000 feet. It lies eight miles downstream from the head of navigation at the Falls of St. Anthony, and 396 miles northwest of Chicago by highway. St. Paul is a port city and a port of entry. Its area is 55½ square miles and it is contiguous with Minneapolis, the two municipalities being known as the Twin Cities. The Mississippi cuts through both cities, following a southeastward course past Fort Snelling and the confluence of the Minnesota River, and then striking north into St. Paul's business section, beyond which it again turns south.

The upper Mississippi at St. Paul, spanned by four bridges, is about 1,200 feet wide. Facing downstream, the greater part of the city is on the left; and along the left, or north, riverbank is a series of natural terraces. St. Paul's right riverbank is lined with high bluffs. The configuration of the land on which St. Paul has grown up does not permit everywhere of a formal arrangement of streets. However, broad modern boulevards have been developed for ease and rapidity in traversing the city, and most of its thoroughfares are tree-bordered. About 70 per cent of the city's families own their homes.

Transportation.—St. Paul is served by nine railroads: the Chicago, Burlington & Quincy; Chicago, Rock Island and Pacific; Chicago Great Western; Chicago, Milwaukee, St. Paul & Pacific; Chicago and North Western; Great Northern; Northern Pacific; Minneapolis & St. Louis; and the Minneapolis, St. Paul and Sault Ste. Marie. The Minnesota Transfer Railway Company, jointly owned and operated by these railroads, provides large freight yards for shipping services over all nine roads. The city is served by more than 100 motor carriers, and federal and state highways fan out in all directions. The Mississippi's channel at this point is nine feet in depth, and about 25 barge lines have operations at the port. St. Paul's municipal barge terminal is one of the largest on the upper Mississippi. The Minneapolis-St. Paul International Airport is jointly owned and operated by the twin cities and is served by several commercial airlines with scheduled service.

Business and Industry.—Minnesota provides many of the raw materials consumed by the city's manufacturing plants, and the surrounding agricultural area is an excellent market for many of the city's manufactured products. St. Paul's trade area, however, includes five other states. There are about 600 wholesale and 3,900 retail concerns within the city. Meat packing is a leading industry of Greater St. Paul, the South St. Paul (q.v.) market ranking second in the United States both in saleable livestock receipts and in cattle, calf, and hog slaughter. St. Paul's manu-

facturing and processing plants, which total more than 900, produce refrigerators, heavy hoist equipment, adhesives, abrasives, roofing granules, storage batteries, glass, wood and paper products, sportswear, canned goods, preserves, and other commodities. In the city are railroad and machine shops, foundries, and a large automobile assembly plant. Printing and publishing are also important in the city's economy, and St. Paul contains the largest law book publishing concern and is the nation's largest producer of advertising specialties. The processing of furs for the market and the manufacture of leather goods are St. Paul's oldest established industries. St. Paul has 19 banks and their clearings in 1950 totaled about $5,185,000,000.

Educational, Cultural, and Recreational Facilities.—The educational facilities of the city include public, private, and parochial elementary schools, in addition to a number of private day and boarding institutions, both denominational and nondenominational. There are special facilities for the education of deaf and otherwise handicapped children. Bethel Institute (Baptist, coeducational), besides being a two-year junior college, includes a three-year theological seminary. Other seminaries are Luther Theological (Evangelical Lutheran, for men) and St. Paul (Roman Catholic). The St. Paul College of Law, a private institution accredited by the American Bar Association, conducts a four-year evening course in law. The University of Minnesota maintains its department of agriculture on a 465-acre campus in St. Paul where the School of Agriculture and the College of Agriculture offer, respectively, three- and four-year courses. St. Paul School of Art provides training in painting, sculpture, and design. For the liberal arts, St. Paul has the College of St. Catherine (Catholic, for women), the College of St. Thomas (Catholic, for men), Macalester College (Presbyterian, coeducational), Concordia (Lutheran, for men), and Hamline University (Methodist, coeducational). The city maintains a public library system with a collection of around 500,000 volumes. Its James Jerome Hill Reference Library is considered outstanding, and its collections, totalling 160,000 volumes, are especially strong in architecture, decoration and design, Oriental art, economics, the natural sciences, psychology, sociology, and technology. Among special libraries are the collections of the Minnesota Historical Society which include manuscripts, books, newspapers, war records, and other materials. The Ramsey County Medical Society Library contains a valuable collection of medical Americana. The public library also exhibits a collection of cuneiform tablets, and the Minnesota Historical Society Building contains a museum which displays furniture and other relics of the state's pioneer period. St. Paul Seminary has a collection of furniture and other relics of the early Catholic priests and missionaries; and the St. Paul Institute, a municipal museum, contains exhibits of the sciences and applied arts. The city maintains a zoo, and also a conservatory which includes an unusually fine collection of tropical plants.

The St. Paul Civic Opera Association presents each year light opera and operettas for which local talent is largely used although, occasionally, internationally famous stars are imported. In cooperation with other groups, the association also presents summer concerts at popular prices. The Shubert Club presents a concert series during the winter with internationally famous artists. Through the club's scholarships and programs, it encourages local talent in musical composition and performance. Folk art programs, handicraft exhibits, and the periodic Festival of Nations are promoted by the St. Paul International Institute to help conserve the nation's cultural heritage and encourage better understanding between St. Paul's native and foreign-born people.

The people of St. Paul are predominantly Catholic, but 28 denominations are represented among the city's 248 churches of which 19 are classified as nondenominational. St. Paul is a seat of a Catholic archdiocese.

In addition to entertainment provided by moving picture theaters, night clubs, and other commercial enterprises, the Women's Institute of St. Paul provides programs of interest to the world of women. The St. Paul Figure Skating Club stages ice shows throughout the year, and "Pop concerts." The St. Paul Winter Carnival is an annual event for which a large ice palace is built, a pageant presented, and the whole city more or less gives itself over to the carnival and winter sports. On the Keller Municipal Golf Course, the St. Paul Open Golf Tournament is held annually. St. Paul is the location of Minnesota's important state fair. Among the buildings on the State Fair Grounds is an amphitheater in which an annual horse show, livestock show, and other events take place, but which is converted in winter into a natural skating rink.

St. Paul has numerous public playgrounds and parks covering a total of 3,000 acres. The parks have facilities for such activities as golf, tennis, ball games, skiing, canoeing, and swimming. Highland Park contains an athletic stadium seating more than 10,000 people. One of the two lakes within the city limits is in Como Park, and in winter Como Lake affords the city its largest outdoor skating rink. In this park are a statue of the German poet Schiller (a gift to the city by St. Paul's people of German birth); a bronze bust of Henrik Ibsen by Jacob H. G. Fjelde (1859–1896) who modeled it in Norway from life; and a statue of St. Francis of Assisi by Donald Shepard. Paul Manship, who was born in St. Paul and achieved national fame as a sculptor, is represented by his fountain group, *Indian Hunter,* in Cochran Park, and *Spring Awakening* in St. Paul Institute. Other interesting examples of sculptural work are six marble figures by Daniel C. French, above the central loggia of the state capitol, representing civic virtues; and the gilded copper chariot and driver representing Prosperity, designed by French and Edward C. Potter near the base of the capitol dome. A bronze statue of Martin Luther, a replica of one in Worms, stands on the Concordia College campus. In a public square is *Nathan Hale,* a statue by William Ordway Partridge. The Peace Memorial Statue in St. Paul City Hall and Ramsey County Courthouse building, designed by the Swedish sculptor Carl Milles, is of white onyx and is said to contain the largest carved onyx figure in the world. On its eight-foot base crouch five Indians at their council fire, smoking pipes of peace. From the smoke rises a 36-foot figure of an Indian god of peace, who holds a peace pipe in one hand while the other is outstretched in friendliness. The statue expresses the idea in symbolism that out of conference and understanding come the hope of world peace.

Buildings.—There are numerous buildings in

St. Paul justly entitled to recognition for the excellence of their architectural design. The Minnesota State Capitol is a beautiful and harmonious structure in an adaptation of the High Italian Renaissance. Its marble dome is patterned after that of Michelangelo on St. Peter's Basilica in Rome. The building was designed by Cass Gilbert, who received his early education in St. Paul and whose practice was located in the city when, as a young man, his design was selected for Minnesota's capitol. The Cathedral of St. Paul, containing 10 chapels, was designed by E. L. Masqueray and dedicated in 1916. It bears a general resemblance to St. Peter's Basilica. Its altar and baldachin in the sanctuary were designed by Whitney Warren, and surrounding the sanctuary itself are some unusually fine bronze grilles between the marble columns and arches. Among the newer ecclesiastical edifices is St. James Lutheran Church designed in modern clerestory style by Frank A. Abrahamson, a St. Paul architect. In the façade is a 17-foot sculptured figure of Jesus Christ, designed by Louis Kirchner and carved by Egisto Bertozzi from two blocks of Kasota stone. The Old Customs House, in modified Romanesque design, the erection of which was begun in 1867, is representative of the city's older public buildings. One of the show places of the late 1880's was the 32-room red brick residence of James J. Hill (now occupied by the St. Paul Diocesan Teachers College) in the neighborhood of which other families of wealth built their homes. Architecturally, little remains of the "old" St. Paul, however. The city's skyline is dominated by the 32-story setback skyscraper of the First National Bank. St. Paul's modern style Municipal Auditorium was built in 1907 and enlarged in 1932. It contains a theater with a seating capacity of about 2,800 and an arena accommodating 15,000 people, and is so adaptable that a number of different activities may be carried on at the same time by assemblages of various size. The Women's City Club, which also contains an auditorium, was designed in modern style by Magnus Jemne of St. Paul and some of its interior decorations, furnishings, and lighting are ultramodern. The 19-story St. Paul City Hall and Ramsey County Courthouse is so designed that 80 per cent of it is usable. Its lobby, which is 41 feet high, is so lighted as to give the illusion of limitless height. At one end is the Peace Memorial Statue already referred to. The Federal Building is another of the modern public structures that is functional in design. Functional design is also seen in many of the city's newer industrial structures.

Government.—The city has a commission form of government. The mayor, the six councilmen, and the controller, all of whom constitute the commission, are elected on nonpartisan tickets for two-year terms. Each councilman heads a department. The controller makes up the budget and the council reviews it. The council may increase or cut any item by not more than 10 per cent, although the total cannot be changed by more than 3 per cent. The public education system is administered by an elective school board, but the finances are controlled by the council and controller. The city operates under a home rule charter which can be amended only by a vote of three fifths of the city electorate.

History.—After the Louisiana Purchase, expeditions were sent out by the federal government to explore the new lands. Lieut. Zebulon M. Pike (q.v.) commanded one of these in 1805, and bought from the Indians acreage around the confluence of the Mississippi and Minnesota rivers for the establishment of a military post. In 1817, a site was selected for a fort which Col. Henry Leavenworth (q.v.) was ordered to build two years later. First called Fort Peter's, then Fort Colewater, the post was finally renamed Fort Snelling by Gen. Winfield Scott, in honor of the commandant, Col. Josiah Snelling; and Fort Snelling it remains. In the 1830's squatters settled on the reservation lands, among whom was a French Canadian trader, Pierre Parrant, nicknamed Pig's Eye. In 1840, they were expelled from the reservation. Parrant settled at the landing near Fort Snelling which steamboats had made their Mississippi terminus since 1823. This landing place, to which others were quickly drawn after the area was thrown open to settlement, became known as Pig's Eye. Father Lucian Galtier built a log-cabin chapel there which he dedicated in 1841 to St. Paul, and later prevailed upon the settlers to adopt that more dignified name for their community. Five years later the town of St. Paul was platted, a school was opened; steamboats began regular service, bringing up the river settlers and goods for trade; and St. Paul was the headquarters for the important American Fur Company. In 1849, it could boast at least one hotel, a newspaper, and a population of 840. It was incorporated that year as a town; but, even more important, the first legislature of the Territory of Minnesota met there, and St. Paul was thus made the capital and retained that place when Minnesota became a state. In 1853 the first bank in the whole region was opened there, and the following year St. Paul was chartered as a city. Traders and pioneers from the surrounding areas made it their trade center. Permanent residents were arriving at such a rate that carpenters and masons were hard put to it to supply the demand for dwellings and stores. By 1860, the population numbered 10,401, and horsedrawn stages carried goods and people in all directions. Two years later the first railroad reached the city, and St. Paul's scope of transportation and commerce began to broaden still farther. In 1880, 41,473 people resided in St. Paul, but during that decade population almost trebled, and improvements kept pace. Formerly separated from its twin city, the legal limits of St. Paul were extended to the Minneapolis line in 1884. In 1888, the St. Paul Union Stockyards were established by the railroads and St. Paul businessmen at South St. Paul, where it was customary to water livestock en route to Chicago. Up to about 1890, the city's economy depended very largely on trade and transportation; but, slowly around 1890, more manufactures began to be developed, and the city also took a more important place as an educational and cultural center. In 1914, the city adopted its present form of government.

Population.—Much of the character of the present city is attributed to the Germans and Irish who made up a large part of its early population. With the development of manufacturing many new strains were added and about 40,000 in St. Paul's foreign-born population come from 43 countries. The following figures represent the growth of total population in the present century: (1900) 163,065; (1910) 214,744; (1920) 234,698; (1930) 271,606; (1940) 287,736; (1950) 311,349.

SAINT PAUL, town, Nebraska, county seat

of Howard County; at the fork of the North and Middle Loup rivers; alt. 1,815 feet; on the Union Pacific, and Chicago, Burlington and Quincy railroads. A market town and shipping center for agricultural produce, it was founded in 1871 by a surveyor, James N. Paul, and was originally called Athens. As the state had another Athens it was renamed St. Paul at the suggestion of Sen. Phineas W. Hitchcock. Many Danes and some Swedes were among the early settlers. By 1950 there were more Danes in Howard County than in any other part of the state except Omaha. Pop. (1950) 1,676.

SAINT-PAUL, town, Réunion Island, on the northwest coast, south of Port-des-Galets. It has rail connections with the capital, Saint-Denis. The first French settlement on Réunion (then called Bourbon) in the 17th century, it was the early capital. Pop. (1946) 25,959.

SAINT PAUL ISLAND, largest of the Pribilof Islands (q.v.) of the United States, in the Bering Sea some 200 miles north of the Aleutians. It is about 35 square miles in area and has some 200 inhabitants. See SEALS AND SEALING.

SAINT PAUL SEMINARY, The, a Roman Catholic theological institution founded at Saint Paul, Minn., in 1890. Buildings, and an endowment, all totaling $500,000, were given by James J. Hill (q.v.); and the institution became the provincial seminary of the ecclesiastical province of Saint Paul. The seminary was opened in 1894. The archbishop of St. Paul is president of the board of trustees. The seminary has courses in theology and in philosophy; and three departments of instruction, theology, philosophy, and arts; the courses in the department of philosophy include mental philosophy, psychology, history of philosophy and biology; the courses in the department of arts include Hebrew, Greek, Latin, modern languages, and music, and form a part of the philosophical course; the study of Hebrew is optional. The seminary has a campus of 40 acres, the land sloping gradually toward the Mississippi; the buildings include the administration building, the class building, three residence halls, a dining hall, a gymnasium and the chapel. The library contains over 30,000 volumes, the students number about 186 and the faculty 13.

SAINT PAUL'S CATHEDRAL, one of London's most striking architectural features, is situated on Ludgate Hill, a site once used for pagan worship. The first Christian church was built there, according to the Venerable Bebe, by Ethelbert of Kent (552?–616). Although this original building may have been destroyed in later years of restored paganism, a church was apparently in nearly continuous existence on the site until one was burned down in 1087, to be succeeded by "Old St. Paul's," one of the largest churches in Europe. The London fire of 1666 destroyed this church and Christopher Wren, after being first instructed to rebuild the burned cathedral, was finally allowed to design a new one, although it was insisted that this resemble the old to some degree. Wren's plan was approved by Charles II and, between 1675 and 1710, the present cathedral was built, being a compromise between the medieval plan of the former building and the classical or Italian style. A great dome, topped with a cross, surmounts the building. St. Paul's contains many tombs of famous Englishmen, notably those of Nelson, Wellington, Wren, and Joshua Reynolds. During the bombing of London in World War II, especially on the nights of Dec. 29-30, 1940 and April 16-17, 1941, St. Paul's suffered considerably, while the area around it was devastated. The altar was destroyed, besides damage to the north transept and to the general exterior. Nevertheless, St. Paul's has remained a fine specimen of architecture, for which it owes as little to foreign influence as any in England, and one inseparably associated with the history of London. See also LONDON—*Church Buildings.*

ST. PAUL'S SCHOOL, a boys' boarding school two miles from Concord, N. H. Founded in 1855, it has an enrollment of about 440 boys, a faculty of approximately 55. It is an Episcopal Church school, with the chapel as the center of training in Christian worship and fellowship. Its members are of various religious denominations, but all worship in the chapel, and all boys receive regular religious instruction. The school is divided into six forms, or years. The boys' ages run from twelve in the first form to eighteen in the sixth. The first two forms, and the youngest group in the third, live in the lower school, the rest in groups of twenty or thirty in small dormitories, except the sixth form, which has a large building to itself. Each of these three sections has its own dining room. All dormitories are in charge of masters, aided by selected sixth form boys. In every form, boys of marked ability are placed in advanced divisions which progress faster than the regular divisions; conversely, there are slow-moving divisions for those who need more time to master a subject. The average size of a division is between twelve and thirteen. Every boy is a member of one of the athletic clubs. Since numerous teams exist in each club, most of the boys engage in regular athletics. Occasional games are also played with other schools, but sports are mostly intramural.

SAINT PAUL'S SCHOOL, London, England, an endowed grammar school, founded by John Colet c. 1509, with no limitations as to country, nation or class. It was built to accommodate 153 students and until 1884 stood in Saint Paul's churchyard. It was instituted for the free education of poor children. The original building was burned down in 1666. In 1824, the second one, built by Wren, was taken down and another erected. In 1884 a new school was opened at West Kensington. The course of study was formerly classical, but is now designed to prepare for army examinations. It is interesting to note that Major André, Camden, Halley, Milton, Pepys, Judge Jeffreys, the Duke of Marlborough and Sir Philip Francis were students here.

SAINT PETER, one of the twelve apostles of Jesus Christ (Matthew 10:2). He had been named Simon, but Christ predicted that he would be called Kēphā'—Rock—(John 1:42); the prediction was fulfilled when the Savior conferred this name on him (Matthew 16:18). Peter is the anglicized form of πέτρος, rock, the Greek equivalent of Kēphā'. πέτρος was probably chosen rather than πέτρα which would have been the more accurate translation, because the feminine gender of the latter would hardly have made it suitable for a man's name. In the New Testament, the apostle is called Simon (Mark 1:29);

Peter (Matthew 8:14); Simon Peter (John 21:2), and Cephas (Galatians 2:11). The last is the name most frequently used by St. Paul.

Peter came from the town of Bethsaida in Galilee (John 1:44); later, he set up his home in Capharnaum (Matthew 8:5-14). He was the brother of Andrew, who was also an apostle of Christ (Matthew 10:2). Peter and Andrew were fishermen, exercising their trade on the Sea of Galilee (Matthew 4:18). There is no reason to think that this occupation did not give them a good living; in fact, Peter considered that he had given up much to follow Christ (Mark 10:28). Although he and the apostle John were considered by the Sanhedrin "unlearned and untrained men" (Acts 4:13), that judgment would not have to mean anything more than that they were not skilled in rabbinical science, as were the men before whom they were on trial.

Peter was called three times by Christ to belong to his company; the first call (John 1:40-42), which could hardly be called anything more than a prophecy of future apostleship, was not immediately followed by a permanent association of Peter and Christ, for on the occasion of the second call, Peter was fishing with his brother at the Sea of Galilee, and was met there by the Lord, who invited the two brothers to follow him; a call which they obeyed (Matthew 4:18-20). Some time after this, Christ, after a night of prayer, chose twelve of his disciples to be his chief and closest associates who were henceforth called his apostles; Peter was one of these (Luke 6:12-16). This incident is narrated also in Matthew 10:1-4 and Mark 3:13-19; in all three accounts Peter is named first of the twelve apostles, although the order of the other names is different in each account. The list of the apostles in Acts 1:13 also puts Peter first.

Three of these twelve apostles—Peter and the two sons of Zebedee, John and James—were particularly close to their Master, being chosen to be witnesses of the raising of the daughter of Jairus (Mark 5:37); of the Transfiguration (Matthew 17:1); and of the agony in Gethsemane (Mark 14:33). As in the lists of the apostles, so in these accounts, Peter is always mentioned first.

In Matthew 16:18 there is found the fulfillment of the prophecy of John 1:42: Peter confessed that Jesus was "the Christ, the Son of the living God," and received from the Lord the new name Kēphā', Peter, and the promise which made the name significant: "Thou art Peter (Rock), and upon this rock I will build my Church."

Peter's concern for the welfare of Christ led him, shortly after this, to protest when Jesus predicted his passion and death; for this too-human advice he received a sharp rebuke from the Lord (Matthew 16:23).

Peter is mentioned comparatively often in the account of the Lord's passion and death. It was he who, with John, made the preparations for the Last Supper (Luke 22:8); at the supper, he protested against Christ's humbling himself by washing his feet, but allowed it when Jesus told him that unless he was washed, he would have no part with his Master (John 13:6-9). During the supper, Peter received from Christ the assurance that recalls Matthew 16:18: "Simon, Simon, behold Satan hath asked and obtained *you* (i.e., all the apostles) in order to sift *you* as wheat; but I have prayed for *thee* that thy faith fail not; and when once thou hast turned again, do thou establish thy brethren" (Luke 22:31 following). When Christ declared that on that night Peter would deny him, the apostle protested vehemently, saying that he would die rather than do so (Matthew 26:34 following). He witnessed the agony in the garden, and after Christ's capture was present with John in the courtyard of the high priest, while Jesus was being questioned (John 18:15 following). It was at this time that he was led, through cowardice, to deny three times that he knew his Master; after his sin he was at once repentant, and left the courtyard and wept bitterly (Luke 22:56-62).

On the morning of Christ's resurrection, Peter and John went to the tomb and found it empty (John 20:3-10). Later on that day, Christ appeared to Peter; he was the first of the apostles to see the risen Lord (Luke 24:34; 1 Cor. 15:5). Between the time of the resurrection and the ascension into heaven, Christ drew from Peter a three-fold confession of love, and confirmed him in his position as shepherd of the Savior's flock, prophesying at the same time that he would suffer martyrdom (John 21:15-19).

The first twelve chapters of the Acts of the Apostles show Peter taking the place of chief importance in the church. Before the Pentecost, he announced to the one hundred and twenty disciples that some one must be chosen to take Judas' place in the apostolic college (Acts 1:15 following); after the descent of the Holy Spirit on Pentecost it was he who preached to the amazed Jews the sermon after which about three thousand of them were baptized (Acts 2:14-41). He cured the lame beggar (Acts 3:6); an incident which led to his arrest and that of John who was with him (Acts 4:3). He pronounced judgment against Ananias, who had come to lay at the feet of the apostles part of the price of his property, holding back some while pretending that he was giving the whole (Acts 5:1-4); he and John went to Samaria to impose hands on those whom Philip the deacon had baptized, in order that they might receive the Holy Spirit (Acts 8:14-17). Three years after Saint Paul's conversion, the Apostle of the Gentiles made a visit to Jerusalem for the purpose of consulting Peter, and remained with him fifteen days (Galatians 1:18).

Peter's baptizing of Cornelius the centurion (Acts 10) was an event of greatest importance in the early church. Cornelius was a man "who feared God," that is, he was a pagan who had renounced idolatry and kept the seven precepts which the Jewish tradition considered to have been given by God to Adam and Noah, and so to be binding on all men. It must be observed that such a person was not a Jewish proselyte at all; specifically, among other things, he was not bound to the laws of legal purity as all real proselytes, as well as native-born Jews, were. At Cornelius' invitation Peter visited him, and baptized him without Cornelius' first being circumcised. Such a mode of conduct was against Jewish-Christian norms. When Peter was taken to task for what he had done, he made known to his critics that a vision, given to him at Joppa before he had met Cornelius had shown him that God took no account of the prescriptions prohibiting the association of Jews with the legally unclean (Acts 11:1-18). Although Peter's own mission was to be among Christians who were Jews by birth (Galatians 2:7), his action on this occasion marked the beginning of that definite break with Jewish observances which many of

the Jewish Christians wished to keep in force.

Shortly after this, Peter was imprisoned by Herod Agrippa I; from this imprisonment he was miraculously delivered (Acts 12). Since it is known that this king died in 44 A.D., the year of his death is one of the fixed points for the chronology of the early church.

After the twelfth chapter of the Acts, Saint Luke, the author, turned his attention principally to Saint Paul, and from that point on, we have only incidental information about Peter. A few points of his later life are known also from the Pauline epistles. At the Council of Jerusalem, held around 49 A.D., Peter and James were the apostles who took leading parts (Acts 15). That council decided against the necessity of circumcision for the Gentile converts to the church—a decision in conformity with Peter's earlier conduct in the case of Cornelius. Later than this, at Antioch, Peter was induced because of fear of the Jewish Christians from Jerusalem to hold himself aloof from the uncircumcised Christian converts—a manner of acting which was in contradiction with his own principles and previous action, and one which earned him a public rebuke from St. Paul (Galatians 2:11-14). Paul's concern with the effect of Peter's conduct on others shows the influence that Peter must have had; since it was not Peter alone who acted in this way, and yet Peter alone received Paul's correction. Tradition makes Peter the first bishop of the church at Antioch. Most probably he was in Corinth (I Cor. 1, 12). He was the author of two epistles, each explicitly ascribed to him (I Peter 1:1; II Peter 1:1). The first was written from Babylon, which most exegetes take to be Rome (I Peter 5:13).

That Peter suffered martyrdom at Rome is a tradition which was universal in the Christian world by the end of the 2d century. The tradition has been vigorously attacked since the time of the Protestant Reformation, but it is now again generally accepted; of the doubts entertained against its historicity, A. Harnack said: "That these doubts were mistaken is today unquestionable for all scholars, save those who turn from the light." (*Geschichte der altchristlichen Literatur bis Eusebius,* 3 vols. 1893–1904, vol. 2, p. 244). It is probable that this martyrdom took place under Nero, in 64 A.D., at the beginning of the persecution of Christians, for which that emperor was responsible. The same literary testimony for Peter's martyrdom at Rome is, in many instances, the testimony for his Roman sojourn, asserting that he exercised his apostolic ministry there. Clement of Alexandria (Eusebius, *The Ecclesiastical History,* vi, xiv), states that Mark's Gospel is the record of Peter's preaching at Rome, written at the request of the Christian converts living there. How long the apostle was at Rome before his martyrdom is a matter of uncertainty; the tradition of a twenty-five year sojourn rests on no certain data, and is quite improbable.

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SAINT PETER, Minn., city and Nicollet County seat; on the Minnesota River; 67 miles southwest of Saint Paul; on the Chicago and North Western and the Chicago, Saint Paul, Minneapolis and Omaha railroads; and state and federal highways. Situated in a dairy, stock, grain and poultry farming section, it has kindred industries; a gravel washing plant; and manufactures men's work garments. The Gustavus Adolphus College, a co-educational institution of higher learning, founded under Lutheran auspices at Red Wing in 1862, was removed to its 25-acre campus here in 1876; and there are a Carnegie public library, and the Nicollet County Historical Society Museum. Of especial interest are the Old State Capitol Building, erected in 1857, when it was proposed that the state capital should be transferred from Saint Paul; and a monument to John A. Johnson (q.v.), a native son who served three terms as governor of the state. Near by is the Traverse des Sioux State Park. Saint Peter has a large state hospital for the insane. The city was founded by Capt. W. B. Dodd in 1853; has a mayor and council; and owns its water works. Pop. (1940) 5,870; (1950) 7,754.

SAINT PETER PORT, Channel Islands, capital of the Island of Guernsey, on the east coast, rises in terraces on the slope of a hill, above a harbor protected by extensive breakwaters. The picturesque 12th century Castle Cornet stands on an island at the mouth of the harbor and Fort George is built on the heights south of the city. Saint Peter Port's streets are steep and narrow, its environs are of exceptional beauty and there are many fine residences. Notable buildings include Saint Peter's Church, a Gothic structure dating from the 14th century; Elizabeth College, founded by Queen Elizabeth in 1563; and Hauteville House, home of Victor Hugo in 1856–1870. Pop. (1931) 16,720.

SAINT PETER'S BASILICA, Vatican City, Rome, generally considered the greatest of Catholic churches, and intimately associated with the Vatican. It is not a cathedral, however, since the pope, as bishop of Rome, derives his title from another church, St. John Lateran, although most of the papal ceremonies have taken place in St. Peter's since the year 1870. St. Peter's is built on the site of the Circus of Caligula. A small sanctuary previously erected there gave way to a basilica during the reign of Constantine (306–337). The latter structure was rebuilt during the early Renaissance after being damaged during the residence of the popes at Avignon. Unfortunately, the length of time consumed in building the present structure (from 1450 to 1626) allowed the plans to be changed several times so that neither the designs of Bramante, employed by Julius II (r. 1503–1513), or those of Michelangelo (under Paul III, r. 1534–1549) were adopted in full, and the series of compromises leaves something to be desired architecturally. The most striking features of the basilica are Michelangelo's beautiful dome, completed about 1590, and the covered colonnade of Giovanni Bernini which leads to the façade after partly encircling the Piazza San Pietro. The colonnade was completed about 1667. The façade, completed in 1626, is largely the work of Carlo Maderna and has been criticized as being out of scale, since even from the far end of the

Piazza San Pietro, some 1,000 feet away from the building, the façade prevents a clear view of the dome. Above the façade is the loggia where the pope is crowned and where he appears on various public occasions. The basilica is immense, covering some four acres and accommodating 50,000 persons. Thirty-four altars, including the main one built over the tomb of St. Peter, are inside the church, which also contains numerous statues and other works of art, and the tombs of many ecclesiastical and temporal dignitaries, notably those of popes and emperors. The scale of the interior and its ornamentation is so vast as literally to dwarf the human figure. See also ROME—*Religion, Churches.*

SAINT PETER'S CANAL. See CANADIAN CANALS.

SAINT PETER'S LAKE, Quebec, Canada, an expansion of the Saint Lawrence River, 35 miles long by 10 miles wide; about midway between the Richelieu and Saint Maurice rivers, and the outlet of many others, including the Saint Francis. Its southern portion has many islands, notable for their fine scenery.

SAINT PETERSBURG (now LENINGRAD), Russia. See LENINGRAD.

SAINT PETERSBURG, Fla., city and port of entry in Pinellas County; at the south end of the peninsula between Tampa Bay and the Gulf of Mexico, but separated from the latter by a chain of islands and Boca Ciega Bay; 275 miles southwest of Jacksonville; on the Atlantic Coast Line, and the Seaboard railroads; with airline and steamship transportation; served by the 7 mile Gandy Bridge across Tampa Bay, and by causeways over Boca Ciega Bay to the island beaches of the Gulf. Saint Petersburg is a resort and residential city, with a sub-tropical setting and year round attractions. Its climate is equable, the highest recorded temperature being 97°, the lowest 28°; while an average of 360 sunny days a year gives it its name of the "Sunshine City." The number of visitors entertained annually totals about 500,000. Built with broad streets, handsome parks and extensive provision for outdoor living and recreation, Saint Petersburg is noted for its thousands of attractive homes, excellent hotels and ample facilities for the entertainment of guests. The beauty of the city is enhanced by its numerous lakes, while the 33 miles of waterfront afford splendid beaches and have many parks and pleasure grounds. The great Municipal Recreation Pier extends a half-mile into Tampa Bay, and an indoor pool and solarium are located on its approaches. The city has exceptional fishing, commodious yacht harbors and boat basins, fine golf courses, and probably the largest shuffleboard club in the world. Saint Petersburg ships fruit, vegetables and fish, and its manufactures include canned goods, building materials and novelties. It has an accredited junior college, a United States Maritime Training School, and the Florida Military Academy is near by at Gulf Port. There is a Coast Guard Air Station, and the United States Veterans Hospital is west of the city line. Points of interest are the Memorial Historical Museum; Turner's Sunken Gardens; the Florida Wild Animals and Reptiles Ranch; and the Alligator Farm. The city was founded by John C. Williams, of Detroit, who purchased the land in 1876 and secured the building of its first railroad in 1888. It was incorporated in 1892, with a population of 300. Pop. (1950) 96,738.

SAINT PETERSBURG, Declaration of, an agreement between the European powers signed in 1868 at Saint Petersburg (Leningrad), Russia, by representatives of Austria, Belgium, Bavaria, Denmark, France, Great Britain, Italy, the Netherlands, Persia, Portugal, Germany, Russia, Sweden, Norway, Switzerland, Turkey and Württemberg. The powers agreed to use in war no explosive projectile of less weight than 400 grams, or 14 ounces avoirdupois. Other provisions were made to reduce the death rate and alleviate the suffering of injured and disabled soldiers by the use of more humane implements of war; practically all of the agreements were discarded by the combatants in the First and Second World Wars.

SAINT PHILIP. See FOGO.

SAINT PHILIP, Fort. See FORT JACKSON AND FORT SAINT PHILIP.

SAINT-PIERRE, Jacques Henri Bernardin de, zhäk ŏñ-rē băr-när-dēn de săñ pē-ār, French author: b. Havre, Jan. 19, 1737; d. Eragny sur-Oise, Jan. 21, 1814. He studied at Caen and Rouen, and entered the army as an engineer, but was dismissed for insubordination in 1761; spent five years in European capitals, seeking support for republican ideals; and afterwards lived in France, except for three years, 1768–1771, when he held an engineer's commission at Mauritius. His first book, *Voyage à l'île de France* (1773), attracted little attention, but recognition as a master of prose came with the publication of his *Etudes de la nature* (1784), while in 1787 *Paul et Virginie* (q.v.), won him immediate and lasting fame. He was admitted to the institute in 1795. Other of his works are *Essai sur Jean Jacques Rousseau* (1790); *La chaumière indienne* (1790); *Harmonies de la nature* (1796); *Correspondence* (7 vols. 1826). Consult Maury, *Etude sur la vie et les oeuvres de Bernardin de Saint-Pierre* (1892).

SAINT-PIERRE, Jacques Legardeur de, zhäk lā-gär-dėr dė, French soldier: b. Normandy, 1698; d. near Lake George, N. Y., 1755. He served with the French Army in Canada against the British in 1740; made Rocky Mountain and Saskatchewan River explorations in 1752; and was in command of Fort de Boeuf, Ohio, when George Washington, as adjutant general of Virginia, presented Governor Dinwiddie's demand that the French leave British territory. Washington in his journal wrote favorably of the French officer. Saint-Pierre was succeeded by Contrecouer in 1753; and led the Indian allies in the Dieskau expedition of the French and Indian War, in which he was killed in action.

SAINT PIERRE, Canada, town in Jacques Cartier County, Quebec, on the north bank of the Lachine Canal, between Montreal West and Lachine, and on the Canadian National and the Canadian Pacific railways. Industries include railway carriage and glass works. Pop. (1951) 4,976.

SAINT PIERRE. See RÉUNION, ILE DE LA.

SAINT PIERRE, West Indies, a former chief town in the volcanic island of Martinique (q.v.). Prior to the eruption in 1902 of Mont Peleé, Saint Pierre was the largest and most flourishing city not only of Martinique but of the Lesser Antilles, with a population of 26,000. It was an important seaport and a bishop's see. The principal buildings were the cathedral, lyceum and palace of justice. There was a fine botanical garden containing rare and peculiar specimens, etc.— all destroyed by the sudden catastrophe above noted, together with the entire population.

SAINT PIERRE AND MIQUELON, mēk-lŏn. The small colony of Saint Pierre and Miquelon is doubly interesting for France inasmuch as it is the only one of the French settlements which is situated outside the tropical zone, and is furthermore the last link which exists of France's one-time Canadian empire. The colony, moreover, despite its small area, has been prosperous for a number of years, thanks to its fishing industry, but this latter has recently declined a little. The three islands of Saint Pierre, of Greater and Smaller Miquelon, have an area of 241 square kilometers (93 square miles) and a population of about 4,175. The islands are situated on the Atlantic Ocean, 15 to 30 miles from the southern coast of Newfoundland and about 3,700 kilometers (2,298 miles) from the port of Brest.

The form of Saint Pierre is most irregular: high and rocky from the cape of Aigle, running in an eastern, northern and western direction as far as Cape Savoiard; becoming inflected toward the country dominated by Mount Galadry. The island of Miquelon is divided into two parts: Greater Miquelon and Smaller Miquelon, the latter commonly called Langlade. Smaller Miquelon is separated from Saint Pierre by a stretch of sea about a league wide which is highly dangerous to navigation. Saint Pierre is the only part in the entire colony which possesses a harbor capable of anchoring large vessels arriving from Europe or America.

There are six islets dependent on Saint Pierre, Greater and Smaller Colombier and the four islets, Ile aux Chiens, Ile aux Vainqueurs, Ile aux Pigeons and Ile Massacre.

The climate is severe. Although Saint Pierre is situated in a more southerly latitude than Paris, winter is very cold and long; living conditions are hard and were it not for the fishing industry the country would be desolate.

Industries, etc.— Cod fishing is the only remunerative industry of the colony. This is a profitable trade for the ship-owners and makes an excellent school for sailors. The fisheries were very prosperous some years ago, the exportation of cod amounting in 1899 to about 15,000,000 francs ($3,000,000), but fell to 6,000,000 in 1905 ($1,200,000), dropping still lower in subsequent years. Connected with the cod fishing industry are ll the other seaport trades (carpentry, sailmaking, smithing, cooperage).

The agricultural resources of the colony are not very important. The island of Saint Pierre is really just a rock, almost devoid of fertile soil and would have been entirely unproductive if the inhabitants had not to a certain extent overcome nature. Miquelon is better suited for agricultural experiments. The average trade of Saint Pierre and Miquelon during the five years 1911 to 1915 was 11,517,267 francs ($2,303,453); in 1944 imports were valued at 37,250,000 francs and exports at 10,416,000 francs.

History.—Fishing attracted Frenchmen there from the time of Henri IV. While many Normans and Saintonegals settled in Canada, Bretons and Basques came to the island in 1604 to fish for cod. Expelled from Newfoundland in 1713 and Acadia in 1763, many French Canadians settled in Saint Pierre and Miquelon. However, in 1778, the English forced these emigrants, numbering some 2,000, to return to France. After the Treaty of Versailles in 1783, they returned to the two islands only to be driven out again during the Revolutionary Wars, but came back in 1816 when the colony was definitely restored to France. The Anglo-French agreement of 8 April 1904 definitely settled all differences regarding the French shore, i.e., the rights of preparing and drying the fish. By this arrangement France retained fishing rights in the territorial waters of the French shore; or in other words over a coast 18 kilometers (12 miles) in length.

SAINT QUENTIN, săn kŏn-tăn, France, a city in the department of Aisne, on an acclivity overlooking the Somme, about 95 miles northeast of Paris. The location of Saint Quentin is of considerable strategic importance, and it has figured conspicuously in various wars, notably in 1557, in the Franco-German War in 1870, and most severely in the great World War of 1914–18. It was the centre of some of the most ruthless acts of warfare in the Teutonic assaults and little remained after the conflict but a great ruin pile. Under the terms of the Peace Treaty of 1919 German labor and capital, as determined by the Reparation Commission, have effected a complete restoration. Prominent among its buildings is the fine Gothic church of Saint Quentin, erected 1114–77, with a special feature of double transepts. Other buildings are the courthouse, library, theatre, hospitals and lyceum. The principal manufactures are cotton and woolen goods, tulle, embroideries, lace and guipure of several kinds; there are important foundries, machine works for various special industries, brick and tile yards, and in the vicinity, numerous sugar mills. There is an active commerce in cotton and linen yarn and in grain. Several monuments and statues commemorate the defense of the town and its native literary celebrities. Pop. about 50,000. See WAR, EUROPEAN.

SAINT RAYMOND, Canada, village in the province of Quebec, on Little River Sainte Anne, 28 miles west of the city of Quebec, and on the Quebec and Lake Saint John and the Canadian Northern Railroad. There is a Roman Catholic convent and Saint Joseph's Commercial College is located here. Pop. 1,772.

SAINT REGIS, rē'jĭs, N. Y., and Canada, village, part in Franklin County, N. Y.; alt. 170 feet; part in Huntingdon County in the province of Quebec, on the right bank of the Saint Lawrence River, at the mouth of the Saint Regis River. It was settled in 1760 by the Saint Regis tribe of the Iroquois Indians, and is inhabited solely by their descendants. Both the British and American branches of the tribe speak the Mohawk language. The village is about five miles from a railroad station in New York State; but

it has steamboat connection with Cornwall, Ont., and in summer with all river ports. The village is in a fertile agricultural region; the Reservation extends along the Saint Lawrence, in both the United States and Canada, for about nine miles. Many of the Indians are engaged in farming, but the chief occupation is basket-making in which they excel. The historic Caughnawaga bell hangs in St. Regis Roman Catholic Church. The bell was a gift of Louis XV of France, was captured by the British, hung for a time at Groton, Mass., whence Indians retook it. Saint Regis has five schools in New York State and two in Canada. Eleazar Williams lived here for some time. Pop. (1940, St. Regis Indian Reservation) 1,262.

SAINT REGIS INDIANS, a group of Roman Catholic Iroquois from Caughnawaga, Quebec, who during the French and Indian War were established in a village which is now the boundary between New York and Quebec. The Jesuits founded among them the mission of Saint Francis Regis, hence their present name. These Indians remained neutral during the Revolution, and their number was considerably augmented by other Iroquois early in the 19th century; but their reservation extending across the international boundary, they were divided in partisanship during the War of 1812. There are now about 3,000 of these Indians remaining, approximately half on the Canadian and half on the New York side.

SAINT REMY, săn rē-mē, France, in the department of Bouches-du-Rhône, near the forest of Saint Benoit, is a village 14 miles northeast of Arles. It is celebrated for its Roman antiquities, the chief of which are the triumphal arch (100 A.D.) and the monument of the Julii. The latter is attributed to the period of the early empire, and consists of a square base ornamented with military basreliefs, surmounted by Corinthian semi-columns connected by arches, which support a second series of 10 Corinthian columns and a dome. Two statues stand in the upper portion. In the neighborhood of Saint Remy is the old priory of Saint Paul-de-Mausole with a Romanesque church and cloister of historic interest. Near the village are building-stone quarries, and seed-cultivation is carried on.

SAINT RONAN'S WELL, a novel by Sir Walter Scott, published in 1823. The scene is laid about a mineral spring, a quasi watering place, called Saint Ronan's Well. The book is the only society novel attempted by Scott.

SAINT-SAENS, Charles Camille, French musician: b. Paris, 3 Oct. 1835; d. Algiers, 16 Dec. 1921. He received his musical education in the Conservatory of Paris; in 1853 became organist of the church of Saint Merri, and in 1858 of the Madeleine, where he continued till 1877. His first comic opera, 'La princesse jaune,' was produced in 1872, and 'La timbre d'argent' in 1877. 'Samson et Delilah,' a sacred drama, was produced at Weimar also in 1877, and was subsequently successfully revived at Rouen. His grand operas 'Etienne Marcel' (1879); 'Henry VIII' (1883); 'Proserpine' (1887); 'Ascanio' (1890); 'Phryné' (1893), have not maintained their early popularity to the present day. He produced 'Andromaque' (1903), and 'L'Ancêtre' (1906), and was known also as a musical critic and author of 'Rimes familières' (1886); 'Problèmes et Mystères' (1894). He was elected member of the Academy in 1881. Although he did not attain highest rank in opera, many of his instrumental works, which include three symphonies, four symphonic poems, two orchestral suites, several concertos for piano and orchestra and violin and orchestra and a quantity of chamber music, show consummate talent if not genius. Consult Neitzel, 'Saint-Saens' (1899); Baumann, L'Œuvre de Saint-Saens' (1905).

SAINT-SIMON, Claude Henri, klōd ŏn-re săn-sē-mōn (Eng. sānt sī'mọn), COMTE DE, French socialistic reformer: b. Paris, 17 Oct. 1760; d. there, 19 May 1825. Born of a family which traced its descent to Charlemagne he conceived that his origin destined him to great achievements. At 13 he offended his father by skeptically refusing to receive his first communion. Before he was 16 he gave his servant orders to call him in the morning with the summons, «Rise, M. le Comte, you have great things to do.» At 18 he entered the army and he served in the closing campaigns of the American War of Independence, distinguishing himself on the day of Cornwallis's surrender at Yorktown (17 Oct. 1781). Returning home with the order of Cincinnatus, he was captured in the naval combat in which the French were defeated by Rodney, and remained a prisoner at Jamaica till the peace of 1783. On his return he was created a Knight of Saint Louis, and appointed colonel of a regiment; but after a brief period of garrison duty at Metz, abandoned the service in order to travel. He went to Holland in 1785, and to Spain in 1787. Here he was successful in introducing diligences in Spain. On the outbreak of the Revolution of 1789 he joined himself to those who petitioned the assembly for the abolition of titles of nobility, but took no further part in the political movements of the time; being wholly absorbed in the pursuit of wealth. Speculation in the national domains created by the confiscation of the effects of the nobility and clergy afforded unlimited scope for his ambition. In this career he was joined by De Redern, whom he had known in Spain. Their speculations were at first unfortunate. Redern fled and Saint-Simon was imprisoned as a nobleman for 11 months. On his liberation he realized a considerable fortune by paying for the property he had acquired in assignats, the market value of which had fallen to six francs the thousand, while they were still received at full value in payment of the national domains. During his imprisonment he had plenty of time for reflection and the thoughts he entertained may be guessed from a vision which he had. «Charlemagne,» he relates, «appeared to me and said, 'My son, your success as a philosopher will equal mine as a warrior and statesman.'» In order to fulfil the mission which he had thus received he became in his 38th year a student of science, resided opposite the Ecole Polytechnique, and subsequently the Ecole de Medecine, in order to enjoy communications with the professors, whom he invited to his table.

In 1802 and 1803 he traveled in England and Germany, without, as he says, acquiring any new experience of importance. During his stay at Geneva he produced his first work

Lettre d'un habitant de Genève à ses contemporains. He proposed that the savants should be maintained at the public expense; that spiritual power should be in their hands, temporal in that of the proprietors; while the "great chief of humanity" should be elected by the masses. Religion, he observed, was merely a human invention. Having exhausted his means he obtained the post of a clerk at the *mont de piété.* At this time he encountered Diard, whom he calls his only friend. This associate not only took on himself the charge of his maintenance, but provided means for the publication of his works.

The death of Diard in 1810 plunged him again into want; and having written two more works, *Sur la science de l'homme* and *Sur la gravitation universelle,* he found himself without means to publish them. Later Augustin Thierry, who became his intimate disciple, cooperated in editing his work on the *Réorganisation de la société européenne* (1814), in which he endeavored to demonstrate the uselessness of the Congress of Vienna, and to show that a European parliament, with the right to determine differences between different nations, was the only means of preserving general peace; and for the promotion of this he advocated union between England and France. The last proposal, perhaps the most sensible he had yet made, caused him to be regarded as a madman. This was his first work which attracted general notice. Finding the difficulty of procuring the means of subsistence and of publishing his works increasing, he made an unsuccessful attempt in 1823 at self-destruction which resulted in a mutilated visage and the loss of an eye. He next produced his last work, *Le nouveau christianisme* (1825), to which he owes his position as the founder of a sect. Christianity he now averred to be a progressive system, which had been rendered immovable by the bonds of ecclesiastical law. Taking its fundamental principle of love he held the church to be a complete organization of society for ministering to the wants of the whole, and especially of the more numerous and poorer classes. A social hierarchy based on capacities and services, with authority to divide heritages, distribute salaries, regulate vocations and take all necessary means for making the labor of all contribute to the common good, was deduced from these premises by his disciples.

The disciples of Saint-Simon rapidly grew into a sect, and were joined by other eminent men. They attempted to idealize the life of their founder, and make it a consistent whole, dominated from the first by the idea of the mission he was to accomplish. Society was divided by the Saint-Simonian doctrine into three classes, priests, savants and laborers, and was to be governed by the chiefs of the three classes. Capacity was to be the ground of distribution of functions. All property was to become on the death of the proprietor the property of the church or society. All children were to receive a general education till their particular capacities became manifest. Saint-Simonism in short was an attempt to render men benevolent by external regulations; to do the work of Christianity without its authority and without its weapons.

SAINT-SIMON, Duc de (Louis de Rouvroy), French author: b. Paris, Jan. 16, 1675; d. Laferté, March 2, 1755. He entered the army in 1693, but soon resigned because not given anticipated promotion, then was employed in several diplomatic missions, and was one of the council of regency under the duke of Orleans; but with the accession to the regency of the duke of Bourbon he fell into disgrace, and withdrew from public life. His memoirs, commenced in 1694 while he was serving in the army and on which he labored for 60 years, remained a long time in manuscript, and were afterward published in a mutilated form with many suppressions. The first edition, in 13 volumes, appeared in 1791; an edition by Cheruel and Regnier, in 20 volumes, in 1856 fol., and revised in 1873–1877; and the first complete edition appeared in Paris in 1829–1831 (in 21 vols.), entitled *Mémoires complets et authentiques du Duc de Saint-Simon sur le Siècle de Louis XIV, et la Régence, publiés pour la Première Fois sur le Manuscrit Original Entièrement Ecrit de la Main de l'Auteur, par M. le Marquis de Saint-Simon.*

SAINT SIMON, sânt sī'mŭn, an island of Georgia, at the mouth of the Altamaha River, and separated from Jekyl Island, on the south, by Saint Simon Sound, and from Wolf Island on the north, by Altamaha Sound. It is one of a group of islands long famous for the production of sea-island cotton. In 1733 this island, together with some of the mainland adjacent, was ceded to James Oglethorpe by the Creek Indians. The settlement on the island was attacked in 1742 by a Spanish force from Saint Augustine. The soil is fertile and the vegetation luxuriant.

SAINT SOPHIA, sō-fē'ä, Constantinople, the most famous Byzantine church, was sponsored by the Emperor Justinian and designed by Anthemius of Tralles and Isidorus of Miletus. Begun in 532, it was dedicated December 27, 537. As a result of an earthquake in 558, part of the work collapsed, to be rebuilt and the apex of the main dome raised about 20 feet by the younger Isidorus, completed 563.

The church proper takes the form of a rectangle measuring about 260 feet by 240 feet, divided longitudinally into a nave and side aisles. The nave is covered by a dome, 100 feet by 106 feet and 184 feet high, supported on four pendentives; half domes to the east and west abut it and are themselves abutted by domed exedrae. To the north and south broad arches carry the main dome. The aisles are vaulted in a variety of forms with women's galleries above. A ring of windows at the base of the dome floodlight the interior, with additional windows in the walls above the aisles and elsewhere. Monolithic columns of green Molossian marble separate nave and aisles, while porphyry shafts are used in the exedrae. The four main piers supporting the pendentives are built of stone, peperino, but the walls, arches, and vaults are in brick. These materials are, however, sheathed in colored marble so cut that the veining pattern is reversed in neighboring slabs. Richly carved capitals and moldings were treated with gold leaf contrasting with deep blue in the incisions. The upper part of the walls and the arches and vaults are completely covered with mosaic, largely in pure design against a gold background but with some

figure compositions in the vestibule and elsewhere, and cherubim on the main pendentives. The ambo, iconostasis, and ciborium were sheathed in silver while the crucifix and altar were of gold.

So sumptuous a building could hardly have been completed without the close backing of the emperor; it is estimated to have cost $75,000,000. The most obvious later additions are the four minarets constructed after the Turkish conquest of Constantinople in 1453 and the conversion of Saint Sophia into a mosque. The Turks also covered the figure mosaics and, in 1847–1849, added the brownish red banding of the exterior in stucco. In the present century the Turkish government permitted the mosaics to be uncovered, and on Feb. 1, 1935 converted the famous building from a mosque into a museum.

Consult Lethaby, W. R., and Swainson, H., *The Church of Sancta Sophia, Constantinople: A Study of Byzantine Building* (1894); Swift, E. H., *Hagia Sophia* (1940).

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SAINT STEPHEN, town, Province of New Brunswick, Canada, in Charlotte County, at the head of tidewater on the St. Croix River which enters the Bay of Fundy about 60 miles west of the city of St. John. It is immediately opposite the town of Calais, Maine, with which it is connected by an international bridge. It is on the Canadian Pacific main line from Montreal to St. John and has steamboat services with St. John and other Bay of Fundy ports. Founded by United Empire Loyalists, and later a lumbering and shipbuilding center, there are now 16 local industries, the largest being a confectionery factory. The Chipman Memorial Hospital, and a weekly newspaper, are in the town. Pop. (1951) 3,746.

SAINT SWITHIN, an English prelate of the 9th century, chaplain to King Egbert and tutor to his son, Ethelwulf. He was ordained to the priesthood in 830, was charged with the education of Prince (afterward king) Alfred, and in 852 was made bishop of Winchester. He died about 10 years later. He was canonized a century later. The popular knowledge of this saint's name is due to the belief that if rain falls on July 15 (which is commonly known as Saint Swithin's Day) it will rain for six weeks after. This notion is said to have arisen from the fact that when the bones of Saint Swithin were about to be removed, after his canonization, from their original resting-place in Winchester church-yard to the interior of the cathedral, their removal, which was to have taken place on July 15, was delayed for 40 days by the excessive rains which fell uninterruptedly for that period. In France, the watery saints' days are those of Saint Médard (June 8) and Saints Gervais and Protais (June 9); in Flanders the rainy saint is Saint Godelième; and in Germany there are three saints' days, to which this belief attaches. The origin of the tribute called "Peter's Pence" has often been assigned to Saint Swithin.

SAINT THOMAS, city, Province of Ontario, Canada, about 120 miles west of Toronto, the county center of Elgin County which is one of the most productive mixed farming and fruit-growing areas of the province, fronting upon the middle section of Lake Erie. It is noted as a transportation center situated about midway between Buffalo and Detroit, being divisional point of the Michigan Central, Wabash, and Pere Marquette railways in addition to branches of the Canadian National and Canadian Pacific systems. It is also on the London and Port Stanley Electric Railway 16 miles south of London and 8 miles north of Port Stanley on Lake Erie which connects with Cleveland across the lake. The railway repair shops are among the largest of the local industrial plants, but there are large manufactories of railway rolling stock and equipment as well as of automobile supplies, miscellaneous brass and copper products, and neon signs. There is an industrial commission and a planned industrial area of 78 acres. It is pleasantly situated on Kettle Creek, and an equable climate makes it a popular residential city. St. Thomas was founded by and named after Col. Thomas Talbot a companion in arms of the Duke of Wellington who obtained a grant of 5,000 acres in the neighborhood and settled at near-by Port Talbot in 1803. Population (1951) 17,942.

SAINT THOMAS, second largest of the United States Virgin Islands, lying 40 miles east of Puerto Rico; area 27.12 square miles. The surface is hilly, and only a small portion of the land is cultivated; sugarcane, aloes, fibrous plants, fruit, cotton and vegetables are grown, but cattle raising is increasingly important. Rum and bay-rum distilling are the chief industries and there is a growing tourist industry. The population is predominantly Negro, with a minority of Norman-French settlers. Saint Thomas was once of great commercial importance; its capital, Charlotte Amalie, which is also the capital of the Virgin Islands of the United States, was at one time one of the chief emporia of the West Indies.

The island was first colonized by the Dutch in 1657, but they soon abandoned it. A Danish settlement in 1666 was also ephemeral, but in 1672 the Danes made a permanent settlement at St. Thomas Harbor. After a period of control by a Danish company the island was returned to the crown in 1755 and Charlotte Amalie became a free port. The English held it in 1801–1802 and 1807–1815. Slavery was abolished in 1848.

In 1870 negotiations were made for its purchase by the United States, but Congress refused to ratify the treaty; it was also included in the treaty of 1902 for the purchase of the Danish West Indies by the United States, which was rejected by the Danish Folkething. The sale was consummated in 1917 by the payment to Denmark of $25,000,000, after protracted negotiations conducted for the United States by Maurice Francis Egan, American minister to Denmark. During World War II the United States maintained a base here. Pop. (1950) 13,811. See Virgin Islands of the United States.

SAINT THOMAS (Port. São Thomé, sounn tōō-mâ'), West Africa, a volcanic island in the Gulf of Guinea, 170 miles west of the mouth of the Gabun River, belonging to Portugal. Its highest peak, Saint Anna, rises from the center of the island to a height of about 7,000 feet. The valleys are fertile but unhealthful; the ele-

vated portions, swept by fresh breezes, are on the contrary, salubrious. The chief products are coffee and cocoa, cotton, sugar, indigo, sweet potatoes, dates, etc. There are large numbers of domestic animals. Saint Thomas, on the northeast coast, is the seat of a bishop, and the chief town. The island was discovered by the Portuguese on Saint Thomas Day, 1471, and was colonized in 1493. The Dutch occupied it from 1641 to 1844. With the island of Principe it forms a province administered by a governor with a total area of 320 square miles, and total pop. of 59,055.

SAINT THOMAS. See Sao Thomé.

SAINT THOMAS, Christians of. See Christians of Saint Thomas.

SAINT VALENTINE'S DAY, the 14th of February, so called after a Christian martyr of the Roman period. The custom peculiar to the day of exchanging missives of affection and love is believed to have been handed down from the Roman festival of the Lupercalia, celebrated in the month of February, when the names of young women were put into a box and drawn out by men as chance directed. For many centuries, if not up to the present time in certain remote districts, Saint Valentine's Eve was celebrated in a manner very similar to the fashion of Roman heathen times, maids and bachelors throwing billets with their names on into a receptacle and drawing therefrom by chance the name of some one of the opposite sex, who became thereupon for the year following the "valentine," or chosen companion, of the other more or less lucky individual. The sending of valentines by message or mail is one outgrowth of the custom formerly prevalent. The custom has expanded in the presentation of affectionate valentines by parents to children and children to parents and husbands and wives to each other. In genial climates Valentine's Day is about the mating period of birds, and this is supposed to have had something to do with the origin of the customs with which the day is associated.

SAINT-VICTOR, săn-vĕk-tŏr, **Jacques Benjamin Maximilien,** Comte de, West Indian author: b. Fort Dauphin, Santo Domingo, 14 Jan. 1770; d. Paris, France, 8 Aug. 1858. He was educated at the college of La Fleche, France, and entered journalism. During Napoleon's reign he was on the staff of *Journal des Débats* and after 1815 he established several Roman Catholic and royalist magazines. He revisited his native land in 1830, spent two years in the United States and then made a tour of the West Indies. He wrote 'Tableau historique et pittoresque de Paris depuis les Gaulois jusqu'à nos Jours' (1808–12); 'Œuvres poétiques' (1882); 'Lettres sur les Etats-Unis ecrites en 1832–33' (2 vols., 1835); 'Journal de Voyage' (2 vols., 1836), etc.

SAINT-VICTOR, Paul Binsse, Comte de, French author: b. Paris, 11 July 1825; d. there, 9 July 1881. He first made himself known as a dramatic and art critic, but soon rose to eminence as a student of the drama and of art and a permanent contributor to the literature of these subjects. His best-known books are 'Men and Gods' (1867–72), and 'The Two Masques' (1880–83). He also wrote 'The Women of Goethe' (1869): 'Victor Hugo' (1885); 'Ancients and Moderns' (1886), and 'The Theatre of To-day' (1889).

SAINT VINCENT, vĭn'sĕnt, **John Jervis,** Earl, English naval officer: b. Medford, Staffordshire, 9 Jan. 1734; d. 15 March 1823. He entered the navy as able seaman in 1744 and in 1760 was promoted to captain and in 1787 to rear-admiral. In the Quebec expedition he led the advance squadron in charge of transports. In 1790 he was returned to Parliament for Wycombe. He commanded in the naval expedition against the French West Indies in 1793 and two years later was made admiral and given command of the Mediterranean fleet. In the engagement with the Spanish fleet of Cape Saint Vincent, 14 Feb. 1797, he captured four of the enemy's ships and averted the impending invasion of England. For this he was granted a pension and made Earl Saint Vincent. He was first lord of the Admiralty 1801–04 and introduced many reformatory measures. He held once more command of the Channel fleet, but retired in 1807. At his death the nation raised a statue to him in Saint Paul's Cathedral.

SAINT VINCENT, one of the Windward Islands, British West Indies, lying between Saint Lucia and Grenada, area, 150.3 square miles. A chain of volcanic mountains traverse the island from north to south, culminating in the volcano of Soufrière in the north (3,000 feet). Many of the valleys are fertile and about one-sixth of the total area is under cultivation. Sugar was once the most important product, but the sugar industry has declined, especially since the hurricane of 1898 which destroyed a large number of plantations. The production of arrowroot has correspondingly increased in importance; cocoa, cotton, fruits and vegetables are also raised, and good timber is obtained from the forests. There is a considerable trade, particularly with the United States. In 1937 the total imports had a value of £203,304; exports £187,086; total revenue, £94,809; total expenditure, £97,502; public debt, £95,390. The island was discovered by Columbus in 1498, and was then inhabited by Caribs; the Caribs were finally subdued by Great Britain in 1795–96 and transported to Ruatan, in the Bay of Honduras; a few returned to Saint Vincent where a reservation was assigned them. The island is governed by an administrator and a legislative council of three official and four nominated unofficial members; before 1877 there was a representative government. In 1812 an eruption of Soufrière devastated a part of the island, and in May 1902 occurred another eruption, contemporaneous with that of Mont Pelée (q.v.). Premonitory signs of eruption were given as early as February 1901, and these warnings increased as soon as Mont Pelée began to be active; the eruption commenced on 6 May, with a burst of smoke, followed by flames; it ceased for a time the next morning, but reached its full force in the afternoon of that day (7 May). Several large plantations were destroyed and about 1,600 persons killed. Pop. 47,961.

SAINT VINCENT DE PAUL. See Vincent de Paul, Saint.

SAINT VINCENT DE PAUL, Society of. See Society of Saint Vincent de Paul.

SAINT VITUS' DANCE. See Chorea.

SAINTE AGATHE DES MONTS, săntà-gat' dā môN', town, Province of Quebec, Canada, in Terrebonne County, about 50 miles northwest of Montreal, noted for its picturesque location on the North River in the Laurentian highlands. It is a popular health and holiday resort both winter and summer. Pop. (1951) 5,169.

SAINTE ANNE DE BEAUPRE, sânt ăn' dē bō-prā', town, Province of Quebec, Canada, Montmorency County, at the mouth of the St. Anne River on the north shore of the St. Lawrence River, 22 miles by rail northeast of Quebec city. For over a century the cathedral church of Ste. Anne, originating in a sailors' chapel in 1658, has been celebrated as the Lourdes of North America, many thousands of pilgrims coming annually to the shrine which is credited with miraculous cures. Pop. (1951) 1,827.

SAINTE ANNE DE BELLEVUE, sânt ăn' dē bĕl-vū', town, Province of Quebec, Canada, on Montreal Island in Jacques Cartier County, on the left bank of the Ottawa River at its confluence with the St. Lawrence which here widens into Lake St. Louis. In the 16th and 17th centuries it was the point of departure for traders and *voyageurs* to the West. It is still a port of call for St. Lawrence-Ottawa River shipping. The Macdonald College of Agriculture, incorporated with McGill University, is situated outside the town. Pop. (1951) 3,342.

SAINTE ANNE DE CHICOUTIMI, sânt ăn' dē shĭ-kōō'-tĭ-mĭ, town, Province of Quebec, Canada, in Chicoutimi County, on the Saguenay River. Owing to the industrial development of the surrounding district it has expanded considerably as a residential district in the decade following World War II. Pop. (1951) 3,966.

SAINTE-BEUVE, sănt bĕv, **Charles Augustin,** French man of letters: b. Boulogne-sur-Mer, France, Dec. 23, 1804; d. Paris, Oct. 13, 1869. After having studied physical and natural sciences under Lamarck and Magendie in Paris, he entered the school of medicine in 1823 and became assistant surgeon to St. Louis Hospital. He devoted, however, only four years to the practice of medicine and turned then to poetry and literary criticism. Having become a contributor to the liberal and philosophical journal, *Globe,* he collected his articles and published them as his first book under the title *Tableau historique et critique de la poésie française au XVI^e siècle* (1828). This book contained a review of Victor Hugo's *Odes et Ballades* and this piece of friendly criticism initiated a fruitful but short friendship between the two men. Sainte-Beuve later became the lover of Mme. Hugo and the discovery of the affair led to a complete break in 1834. In this period of his life Sainte-Beuve was also very much attracted by Saint Simonism and by Lamennais but later he renounced romanticism in all forms and turned to scientific literary criticism. In his "romantic period" he published three volumes of verses, *Vie, poésies et pensées de Joseph Delorme* (1829), *Consolations* (1831) and *Pensées d'août* (1837), and his only novel, the autobiographical *Volupté* (1834).

Sainte-Beuve began his critical work in 1832 and continued it until his death. He published the following collections of essays: *Portraits littéraires* (1832–1839), *Portraits de femmes* (1844), *Portraits contemporains* (1846), *Etude sur Virgile* (1857), *Chateaubriand et son groupe littéraire* (1860). Most famous of his literary essays were the *Causerie du lundi* (1849–1861) and *Nouveaux Lundis* (1861–1866), critical articles published every Monday, commencing in the *Constitutionnel* and continued in the *Moniteur* and the *Temps.* The entire series was republished in 28 volumes, of which the best 15 are entitled *Causeries du lundi* and the rest, *Nouveaux Lundis.* They earned him a worldwide reputation. Posthumous works include *P.J. Proudhon, sa vie et sa correspondence* (1872), *Lettres à la princesse* (1873), being letters to Mathilde, cousin of Napoleon III; *Cahiers de Sainte-Beuve* (1876), *Chroniques parisiennes* (1876), *Correspondence* (1877–1878), *Nouvelle correspondence* (1880), *Le clou d'or* (1880), *La pendule* (1880), *Lettres au professeur Gaullieur* (1895). In addition to his critical work, Sainte-Beuve also wrote a monumental history of the Jansenists, *Histoire de Port-Royal* (5 vols., 1840–1860).

Appointed keeper of the Mazarin Library in 1840, he was elected to the French Academy in 1844. In consequence of the revolution of 1848 he lost the librarianship. Professor of Latin poetry at the Collège de France (1854), the strongly anti-Bonapartist students resenting his support of the emperor interrupted him whenever he appeared in the classroom. He was transferred to the École Normale Supérieure, taught there for three years and, in 1865, was appointed a senator. At this time, however, he had become critical of the Second Empire and regained his popularity by his defense of freedom of thought and speech. His greatness as critic rests on his scientific, objective method, and his devotion to truth.

Bibliography.—Haussonville, Comte d', Bernard de Cléron, *Sainte-Beuve, sa vie et ses oeuvres* (Paris 1875); Troubat, Jules Simon, *Souvenir du dernier secrétaire de Sainte-Beuve* (Paris 1890); Harper, G. M., *Sainte-Beuve* (New York 1909); Benoit-Levy, C. E., *Sainte-Beuve et Mme. Victor Hugo* (Paris 1927); Bonnerot, J., *Bibliographie de l'oeuvre de Sainte-Beuve* (Paris 1937).

SAINTE CHAPELLE, sănt shăpĕl', Paris, one of the oldest palatine chapels and one of the most beautiful architectural monuments of France. It stands within the courtyard of the Palais de Justice. Louis IX (St. Louis) ordered it built as a shrine for the crown of thorns, pieces of the true cross, and other relics. The construction, begun in 1242 or 1243, was finished in 1248. Its Gothic nave, almost perfect in style, has a length of 115 feet and width of 36. It is divided into two distinct chapels. The upper chapel, used by the royal family and communicating directly with the royal apartments in the adjoining palace, has an exquisite interior; almost the entire wall space is occupied by 15 large windows of stained glass.

SAINTE-CLAIRE DEVILLE, sănt-klār-dĕ-vēl', **Henri Etienne,** French chemist: b. St. Thomas, West Indies, March 11, 1818; d. Boulogne-sur-Seine, France, July 1, 1881. Educated in France, he became professor at the Sorbonne in 1859. He undertook far-reaching researches into the phenomena of *dissociation,* physicochemical reactions, which he was the first to study scientifically. Deville put the aluminum and magnesium industries on a practical and commercial footing and he produced both metals on a large industrial scale. He discovered toluene and anhydride of nitric acid and made useful re-

searches into the metallurgy of platinum and other metals.

SAINTE FOY, town, Quebec, Canada, on the northern slope of the escarpment which constitutes the north bank of the St. Lawrence River (including the "Plains of Abraham") immediately above Quebec City. Ste. Foy is about five miles from the latter.

Ste. Foy is noted in Canadian history as the scene of a French victory over the British which came as aftermath to the more famous Battle of the Plains of Abraham and the surrender of Quebec to the British in 1759. The French Army on the latter event and on the death of Montcalm had withdrawn in disorder in the direction of Montreal. Reorganizing, however, under Levis, who had succeeded to the command, it advanced in the following spring to the recapture of Quebec now garrisoned by the British under Sir James Murray. A sortie by the latter was met and brilliantly repulsed by Levis at Ste. Foy on April 28, 1760. A column erected in 1863 commemorates the victory. The arrival, however, of a British flotilla robbed the battle of results by preventing the investment of the fortress, Levis being forced to withdraw upon Montreal where he shared in the surrender to Amherst in the following September.

The town has a large creamery but is in the main a residential adjunct to Quebec. There is an interesting church in the Renaissance style. Pop. (1941) 2,682; (1951) 5,207.

SAINTE GENEVIEVE, sânt jĕn'ĕ-vēv, city, Missouri, and Ste. Genevieve County seat; altitude 401 feet; on the Mississippi River, 65 miles southeast of St. Louis; on the St. Louis-San Francisco and the Missouri-Illinois railroads. It is an important trading center for the fruit orchards and dairy farms in the surrounding area. There are limestone quarries nearby with large kilns for the preparation of lime for commercial use.

Ste. Genevieve was first settled when the region was part of Louisiana but was moved back from the river because of floods. A church standing in the old town at that time was removed to the new site in 1794 and was used for forty more years. Old Memorial Park Cemetery dates back to 1796. At one time Ste. Genevieve's river trade made it a rival of St. Louis. The city government is administered by a mayor and a council. Pop. (1950) 3,992.

SAINTE ROSE DE LAVAL, Quebec, Canada, a town on the northwest shore (Rivière des Milles-Isles) of Jesus Island, Laval County, at the confluence of the Ottawa River with the St. Lawrence. It is mainly residential and suburban to Montreal, from the center of which it is about 12 miles distant and with which it is connected by railway (Canadian Pacific) and frequent bus services. Pop. (1941) 2,292; (1951) 3,630.

SAINTE THERESE, sânt tā-râz', island, Canada, about three miles long, in the St. Lawrence River at the foot of Montreal Island, in southern Quebec.

SAINTE THERESE DE BLAINVILLE, Quebec, Canada, a manufacturing town in the Terrebonne, about 18 miles northwest of Montreal on a branch of the Canadian Pacific Railway. Plywood and veneers are the principal manufactures, with musical instruments a close second. Altogether there are 29 manufacturing establishments, employing 1,229, and producing to the value of $7,282,229 (1948). There are two churches, an academy, a college, a hospital, and two banks. Pop. (1941) 4,659; (1951) 7,014.

SAINTINE, săn-tēn, **Xavier** (Real name Joseph Xavier Boniface), French novelist, poet and dramatist: b. Paris, France, July 10, 1798; d. there, Jan. 21, 1865. He collaborated with dramatists of reputation, including Scribe, Bayard, Désaugiers, and Ancelot, in about 200 plays. Among them were *L'Ours et le pacha* (1827), *Le Bouffon des princes* (1831), *Riche d'Amour* (1845), and *Henriette et Charlot* (1847). His most popular work was *Picciola* (1836), a touching story of a political prisoner whose cult for a flower growing in his prison yard saves his reason. Awarded the Montyon Prize, it was translated in many languages.

SAINTS' DAYS are days set apart by the Roman Catholic Church for religious services in honor of particular saints, after whom the days are named in the calendar. The celebrations differ in different countries, and according to the relation of the name of a particular saint to a particular locality.

In the United States and Great Britain such celebrations take the form of religious services held in churches. In continental Europe and in South America saints' days often take the form of great municipal or even national celebrations.

In Sweden, which is Lutheran as to state religion, it is customary to celebrate what is known as the name-day or day of the saint after whom a person is named, in a similar manner to a birthday.

SAINTS' EVERLASTING REST, The, a devotional work published by Richard Baxter (q.v.) in 1650. By its deep piety and its style of dignified eloquence, hardly a word of which has grown obsolete, it has taken a place with the *Pilgrim's Progress* in the literary treasures of English Nonconformity.

SAINTSBURY, George Edward Bateman, English critic: b. Southampton, Oct. 23, 1845; d. Jan. 28, 1933. He was educated at Oxford, was senior classical master in Elizabeth College, Guernsey, 1868–1874, when he became headmaster of Elgin Educational Institute 1874–1876. From 1875 to 1895 he was engaged in journalistic and literary work in London, and in the last-named year became professor of English literature in Edinburgh University. He held a leading place among contemporary English critics and among his many published works are *Primer of French Literature* (1880); *Dryden* (1881); *Short History of French Literature* (1882); *Manchester* (1887); *History of Elizabethan Literature* (1887); *Essays in English Literature 1780–1860* (1890); *Essays on French Novelists* (1891); *Miscellaneous Essays* (1892); *The Earl of Derby: Corrected Impressions* (1895); *19th Century Literature* (1896); *The Flourishing of Romance and the Rise of Allegory* (1897); *Sir Walter Scott* (1897); *A Short History of English Literature* (1898); *Mat-*

thew Arnold' (1899); 'A History of Criticism' (Vol. I, 1900; Vol. II, 1902; Vol. III, 1904); 'The Earlier Renaissance' (1901); 'Loci Critici' (1903); 'Minor Caroline Poets' (Vol. I, 1905; Vol. II, 1906); 'A History of English Prosody' (Vol. I, 1906; Vol. II, 1908); 'The Later Nineteenth Century' (1908); 'Historical Manual of English Prosody' (1910); 'History of English Criticism' (1911); 'History of English Prose Rhythm' (1912); 'The English Novel' (1913); 'First Book of English Literature' (1914); 'The Peace of the Augustans' (1915); 'A Last Scrap Book' (1924).

SAIONJI, sī'ŏn-jē, **Kimmochi,** PRINCE, Japanese statesman: b. Kioto, 1849; d. Nov. 24, 1940. He studied law in Paris as a young man and became acquainted with M. Clemenceau and he younger radicals of the Third Republic. He was for a time minister plenipotentiary to Germany and Austria-Hungary. For many years closely associated with the late Prince Ito, he succeeded the latter as leader of his party, became president of the House of Peers and of the privy council, minister of education and twice prime minister of Japan, 1906–08 and 1911–12. He was head of the Japanese delegation to the Paris Peace Conference.

SAIPAN. See MARIANAS ISLANDS.

SAIS, sā'ĭs, Egypt, in hieroglyphics SA, a ruined city on the Rosetta or Canopic branch of the Nile, 67 miles northwest of Cairo; site now occupied by the village of Sa-el-Hagar, or Sa of the Stone, which contains no remains of temples or palaces. It was an ancient religious capital, whose famous temple of the goddess of Neith contained the mysterious veiled statue, the subject of Schiller's ballad and of Novalis' romance. In Sais the fête of burning lamps was celebrated, attracting many foreigners; and here was a tomb of Osiris. Sais was also a renowned educational centre frequented by the Greek sages. It gave its name to two Egyptian dynasties, founded by natives of the city. The Saïti kings ruled Egypt for 150 years, until the country was invaded by the Persians under Cambyses. Consult Lepsius, 'Briefe' (p. 12); Wilkinson, 'Modern Egypt' (Vol. I, p. 183); Champollion, 'L Egypte' (Vol. II, p. 219); also Herodotus (II, 29, 59, 169), and Strabo (XVII, 801).

SAIVAS, sī'vaz, one of the three great divisions of the Hindu religion and meaning the worshippers of Siva. These are separated into sects which have varied in number at different periods in the religious history of Hindustan. The worship of Siva seems from a remote period more that of the learned and speculative classes than of the masses of the people. No poetic legends are recorded of this deity. Consult Wilson, 'Sketch of the Religious Sects of the Hindus' (1862); Monier-Williams, 'Religious Thought and Life in India' (1883); Barth, 'Religions of India' (trans., 1882).

SAJOU, same as SAPAJOU (q.v.).

SAJOUS, sa-zhoo', **Charles Eucharist de'Médicis,** American physician and author: b. at sea off France, 13 Dec. 1852; d. 27 Apr. 1929; was graduated from Jefferson Medical College, Philadelphia, in 1878, and was clinical lecturer there 1884–90; professor and dean of the medical faculty of the Medico-Chirurgical College 1898, and professor and president of the faculty of Temple University Medical School after 1909. He received the degrees of LL.D. from Saint Joseph College 1909, and Sc.D. from Temple University in 1915; was made officer of the Academy of France in 1889; Knight of the Legion of Honor of France in 1892; Knight of the Order of Leopold of Belgium in 1890. Dr. Sajous was Fellow of the American Philosophical Society and of the Academy of Natural Sciences and honorary and corresponding member of various foreign societies. He edited Sajous' *Annual* of the Universal Medical Sciences (45 vols., 1888–96); Sajous' 'Cyclopedia of Practical Medicine' (8 vols., 1896 et seq.); editor of the *New York Medical Journal* (1911–1919); was president of the American Medical Editors' Association 1903 and he wrote 'Diseases of the Nose and Throat' (1884) and 'The Internal Secretions and the Principles of Medicine' (1903–22). The latter work was the first to show that the ductless glands sustained life in the tissue cells and that they played a leading part in most diseases, as defensive organs.

SAKAI, sä'kī, Japan, on the southwest of the island of Hondo, seven miles south of Osaka. Before the rise of the latter town it was the chief commercial port of Japan. Osaka now monopolizes the trade. Pop. 105,009.

SAKHALIN, sä-gä-lēn', or **SAGHALIEN** (Japanese **KARAFUTO),** a long mountainous island in the north Pacific, opposite the mouth of the Amur River in Siberia. Its area contains 24,560 square miles. The Strait of La Pêrouse separates it on the south from Yezo, Japan, and the Sea of Okhotsk bounds its eastern and northern shores. The narrow and shallow Strait of Tartary separates it from the mainland. Mounts Bernijet and Ktöns-pal (2,000 to 5,000 feet) are the highest points of mountain ranges extending from north to south and interspersed with valleys of varying width. The principal rivers are the Tym and the Poronai, navigable for a short distance and teeming with fish, especially salmon. Petroleum and naphtha exist and coal is mined by Russian convicts. Agriculture does not succeed owing to the extremely rigorous climate. The island is covered with dense forests. Bears, tigers, sables and wild reindeer abound. Vegetation is Siberian in character. Sakhalin's history begins with the Stone Age, relics of which and of the Bronze Age are still extant, as seen in houses, bones and implements discovered. The island formerly belonged to the Chinese Empire, but early in the 19th century it was annexed by the Japanese who ceded it to Russia in 1875. By the Treaty of Portsmouth, N. H. (1905), following the Russo-Japanese War, the southern portion of the island was ceded to Japan by Russia, which retained the northern portion. The Japanese portion, which was known as Karafuto, had an area of 13,935 square miles and a population of 339,357; the Russian, an area of 10,625 square miles and a population of about 12,000. The massacre of over 350 Japanese in Nikolayevsk in 1920 was followed by seizure of the Russian portion by Japan, which did not evacuate southern Sakhalin until 1925, and was then granted important concessions in oil, timber, and fishing. On Sept. 2, 1945, Premier Joseph Stalin announced that southern Sakhalin would pass to the Soviet Union.

SAKHARA, säk-kä'rä, Egypt, the necropolis of Memphis, about two miles distant from the ruins of the ancient city on the confines of the Libyan Desert. The chief interest lies in its antiquities, tombs and catacombs. Many pyramids rise among its ruins, one of which is remarkable for its doorway of inlaid tiles, bearing a royal name. Mariette discovered numberless sarcophagi, catacombs of the sacred Ibis, tombs of the god Apis, numerous grottoes, etc. What is believed to be the oldest mummy in the world, that of a son of Pepi I of the 5th dynasty, probably over 6,000 years old, was discovered here.

SAKI, a South American monkey of the genera *Brachyurus, Pithecia* and related groups. Its marked peculiarities are a non-prehensile tail, covered with very long hair, round head, short muzzle, ears not unlike those of humans and long-hair covering of entire body. See MONKEY.

SAKI, sä'kē, or **SAKE,** the native beer and common stimulating drink of the Japanese. It is made from rice and is drunk warm, producing a very speedy but transient intoxication.

SAKIEH, säk'ĭ-ĕ, **SAKIA,** or **SAKEEYEH,** a machine used in Egypt for raising water from the Nile for the purpose of irrigation. It is a modification of the Persian wheel and consists of a series of cogged wheels, turned by a buffalo or camel, each revolution of the wheel working up a series of earthen pitchers which empty themselves into a trough or pool.

SAKTA, säk'ta, the designation in the Hindu religion of a worshipper of the Sakti, the power or energy of the divine nature personified in a female form. If the tendencies of the worshipper are toward the adoration of Vishnu, then the personified Sakti is termed Lakshmi or Maha-Lakshmi; if it be toward that of Siva, the Sakti is dominated Parvati Bhavani or Durga. At least three-fourths of the Hindus of Bengal are of this sect, and of the remaining fourth, three are Vaishnavas to one Saiva. Wilson divides the Saktas into Dakshinis, Vamis, Kancheliyas and Kararis. Another classification is into the Dakschinacharis and the Vamacharis, followers of the Right Hand and of the Left Hand Ritual. Consult 'Religious Sects of the Hindus' (1862, p. 32).

SAKUNTALA, sa-kun'ta-la. This masterpiece of Hindu literature is by Kalidâsa, the leading poet of India's second, or Sanscrit period. It is a drama in seven acts and the underlying theme as well as many of its details are derived from the Mahâbhârata, the great national epic of the Hindu race. There are a number of versions of Sakuntâla (also spelled Çakuntâla or Shakuntâla) extant, the Bengalee one coming closest to the original. The drama has also been fashioned for the use of the European stage by Wolzogen, Donsdorf and others. The story of the play runs as follows: King Dushanta weds Sakuntâla, the adopted daughter of the pious hermit Kama, but on her being brought to his court he fails to recognize her, owing to a curse having been pronounced against him. The despairing bride is translated to the realm of the genii, until finally the recovery of a ring, the pledge of mutual faith and love, leads to the reunion of the couple. The great charm of Sakuntâla lies in the descriptive powers displayed by the poet, his keen appreciation of the beauties of nature and of the seasonal changes; his wealth of words is marvelous; his phraseology is often brilliant and picturesque, and the sentiments expressed, particularly as to the master passion, love, are delicate and psychologically true. The action, however, drags and is overburdened with side issues, and the diction suffers from its excessive artificiality and verbosity. Added to these defects is a lack of the sense of proportion, such as the Greek genius possessed in so high a degree. Nevertheless, all authorities are agreed on the rare and dainty charm of Sakuntâla, and Goethe bestowed unqualified praise upon it. The exact time when the poet Kalidâsa lived and wrote this drama is shrouded in uncertainty. Indian tradition and authorities variously assign the time to the 3d century B.C. and up to the 6th century A.D. From strong internal evidence, particularly because of the extremely corrupted form of the Prakrit spoken in the play by the women and subsidiary characters, it is now concluded that the correct period must have been the 2d or 3d century A.D. Consult Schuyler, Montgomery, Editions and Translations of Çakuntâla (in American Oriental Society *Journal,* Vol. XXII, Boston 1901); Henry, V., 'Les littératures de l'Inde' (Paris 1904); Macdonell, A. A., 'History of Sanskrit Literature' (London 1913).

WOLF VON SCHIERBRAND.

SAL-AMMONIAC. See AMMONIA.

SAL-TREE, a valuable timber-tree of India (*Shorea robusta*) second in importance only to the teak. It is found in large forests along the base of the Himalayas and again in another belt in eastern India. It belongs to the order *Dipterocarpaceæ* and yields a hard, heavy dark-brown, close-grained wood which is very durable and highly valued, particularly for gun-carriages and railway ties. A whitish aromatic resin (saldammar) used to calk ships and also for incense (see DAMMAR) is obtained by tapping the trunk. The tusser silkworm feeds on the leaves. The sal forests are protected by the government of India.

SALA, George Augustus Henry, English journalist and author: b. London, 24 Nov. 1828; d. Brighton, Sussex, 8 Dec. 1895. He received some instruction in drawing, but at 15 was obliged to provide for himself. He was a theatrical scene painter for a time, then turned to etching and engraving and had some success as an illustrator. In 1848 he turned to literature and from 1851 to 1856 contributed regularly to *Household Words,* edited by Charles Dickens. His first experience as «special correspondent» was in the letters he wrote for this journal from Russia after the Crimean War. In 1863–64 he was in the United States reporting the Civil War for the *Daily Telegraph,* and later published 'My Diary in America in the Midst of the War.' He followed Napoleon III to Algiers and published as a result, 'A Trip to Barbary by a Roundabout Route' (1866). He established *Temple Bar,* a periodical which he edited from 1860 to 1866, and derived a large income from journalism, but much of his work is cheap and inflated, and no doubt was an important factor in the development of modern reprehensible newspaper methods. He wrote a critical biography

of William Hogarth (1860); and, in addition to works of travel already mentioned, 'America Revisited' (1882); 'A Journey due South' (1885); 'Right Round the World' (1888), works embodying his observations as a tourist and lecturer across the American continent to Australia and India.

SALAAM, sạ-läm', or **PEACE BE WITH YOU,** the common salutation among Mohammedans. The answer is, «On you be peace and the mercy of God and his blessings.» It is improper to address this answer to any but a believer.

SALAD PLANTS, various herbs whose tender, succulent foliage is eaten raw, with or without a dressing. In general, salads should be grown quickly and served as soon as possible after being gathered. They all delight in moist, rich soil with abundance of humus and nitrogenous plant food. Most of them may be sown as soon as the soil can be worked in spring, and some may be sown in autumn and allowed to remain until spring. Few do well in hot weather. Clean cultivation is essential with all of them, and since they are usually quick-growing plants, they are favorites for growing between the rows of later maturing plants, such as cabbage, peas, beets, etc., which are themselves used by market-gardeners in the same way, a later crop being put upon the land as soon as they are gathered. That is a crop of salads, one of cabbage and one of perhaps celery may be obtained from the same area in one season.

In America the most important salad is lettuce, which is extensively grown by truckers and market-gardeners, especially in the East from Florida to Massachusetts, the season starting in January in the South and advancing northward until June, the hot weather checking its production. In the autumn there is a less marked southerly migration. In the North large quantities are also grown under glass to supply local demands. Probably the endive ranks second as a market salad. Its consumption is, however, far less than that of lettuce, and it is less cultivated in the South than in the North, where the cooler climate is more suitable. As a home-salad mustard and cress are probably of next importance in America; in Europe they are grown in enormous quantities for the general market, but in America they are seldom offered for sale. Watercress is more important as a market salad and probably ranks next to endive. It is grown in streams or in damp ground, immense quantities being shipped to the Eastern markets from Virginia. Chicory and dandelion are both popular in the East, but probably more as pot-herbs than as salads. They usually require longer to attain edible size than lettuce and like endive are generally blanched. Chicory is occasionally used in the United States to make *barbe de capucin* and *witloof,* two salads very popular in Europe. The roots are dug in autumn, trimmed and for the former laid horizontally in pyramidal heaps with alternate layers of sand or soil in dark cellars and kept moist by occasional watering; for the second they are buried vertically and covered with some fermenting material for a few weeks. The former is the succulent leaf produced; the latter is a small head something like brussels sprouts. Either may be used as salad or as pot-herb.

SALADIN, săl'ạ-dĭn, or properly **SALAH-ED-DIN YUSSUF IBN-AYUD,** sultan of Egypt and Syria: b. Tekrit, 1137; d. Damascus, 3 March 1193. He entered the service of Nureddin, emir of Syria; became vizier in Egypt about 1169; suppressed the Fatimites in 1171; was proclaimed sultan in 1174 and conquered Damascus and Syria. The great object of his policy was to expel the Christians from Palestine, and recover the city of Jerusalem (see CRUSADES). An atrocious massacre of Mohammedan pilgrims by Chatillon added to his ardor; and his vow of revenge against the perpetrator he was enabled to make good by his famous victory on the plain of Tiberias in 1187, where he captured Guy de Lusignan, king of Jerusalem, Chatillon (whom he cut down after the battle with his own scimitar) and many more. The fruits of this victory was the towns of Acre, Said and Beyrout; after which he laid siege to Jerusalem, which yielded (1187) in a capitulation, to the articles of which Saladin faithfully adhered. He then proceeded against Tyre, but failed in consequence of the destruction of his fleet by the Franks. The intelligence of the loss of Jerusalem reaching Europe produced the Crusade under the Emperor Frederick Barbarossa (q.v.), whose death inspired Saladin with hopes soon damped by the arrival of the forces of Richard Cœur-de-Lion of England, and of Philip Augustus of France. The recovery of Acre by the two kings took place in 1191, upon which event Philip returned to France, and Richard, after twice defeating the sultan, took Cæsarea and Jaffa, and spread alarm as far as Jerusalem. At length a truce was concluded between Richard and Saladin (1192), by the terms of which the coast from Jaffa to Tyre was ceded to the Christians, while the rest of Palestine remained to the sultan. The departure of Richard freed Saladin from his most formidable foe. Though chargeable with unjustifiable means of acquiring power, Saladin employed it, when obtained, usefully for his subjects, whose burdens he lightened, while he benefited them by many useful works and establishments. Magnificent in his public undertakings, he was frugal in his personal expenses. He has been celebrated in Western literature for courage, moderation and justice. Scott introduces him into 'The Talisman,' disguised as the physician Adonbec and as Ilderim. Consult Gaston-Paris, 'La légende de Saladin' (Paris 1893); Reinaud, 'Notice sur la Vie de Saladin' (1874); Baha-ed-din, 'The Life of Saladin' (1897); Lane-Poole, 'Saladin, and the Fall of the Kingdom of Jerusalem' (1898); Yusuf ibn Rafi, 'The Life of Saladin' (tr. for Palestine Pilgrims' Text Society, London 1899).

SALADO, sä-lä'thō, a river of Argentina, rising in the eastern slopes of the Cordilleras, and emptying into the Paraná after a course of 750 miles. It is salty, hence the name.

SALAL, an evergreen shrub (*Gaultherio shallon*), of the northwestern United States, from 2 to 10 feet high, with dark-green leaves and reddish twigs, bearing racemes of flowers, succeeded in August by dark-purple fruit, «salal-berries,» of the size of buck-shot, rough on the outside, very juicy and of a sub-acid flavor.

SALAMANCA, săl-ạ-măn'ka, Mexico, a town in the state of Guanajuato, situated in the south-western corner of the state, on the rail-

road to Guadalajara. It lies in a wide, fertile but somewhat marshy plain. Among its seven churches one is a Gothic structure built on an ambitious plan. The chief industry of the town is the manufacture of porcelain. Pop. (1940) 11,985.

SALAMANCA, city, New York, in Cattaraugus County; altitude 1,380 feet; on the Allegheny River; about 65 miles southeast of Buffalo; on the Baltimore and Ohio; the Erie; and the Pennsylvania railroads; highways 17, 18 and 219, with bus connections to all parts. The business center of a dairy and farming region, its industries include furniture, last blocks, woolens, metal and plastic products. The city has an all-year vacation resort business; is near the Allegany State Park and is on the Allegany Indian Reservation. Its lease rentals are paid to the Seneca Nation. There is a Carnegie Library. Salamanca, originally the township of Bucktooth, was first settled in 1854, when a sawmill was established. In 1862 its name was changed in honor of the duke of Salamanca who helped finance the Atlantic and Great Western Railroad. In 1910 the city was granted a charter. It has a mayor and council government. Pop. (1940) 9,011; (1950) 8,850.

SALAMANCA, sä-lä-mäng'kä, Spain, (1) (ancient SALMANTICA, or HELMANTICA), capital of a province of the same name, in Old Castile, 107 miles northwest of Madrid, occupying three hills on the right bank of the Tormes River. The bridge across the river rests on 26 arches and is of Roman foundation. Its numerous and magnificent ecclesiastical and educational institutions have secured for Salamanca the title of "Little Rome." On the great plaza are the town house, post office, and stores. The Plaza Mayor is one of the finest squares in Europe, and is surrounded by an arcade supported by 90 Corinthian columns. The cathedral, begun in 1513, is a fine example of the florid Gothic, with an elaborate portal, lofty dome and graceful interior columns. There are also an old and massive cathedral of Norman-French style (1102), numerous other churches, and as many convents; the College of St. Bartholomew or Old College (1410), a classic building with an Ionic portico; College of Jesuits; that of the military order of Calatrava, College of the Archbishop (1522, by Fonseca), a colossal and sumptuous edifice with a fine facade and a chapel containing sculptures by Michelangelo; and St. Domingo, the largest convent. The University of Salamanca is one of the most venerable and celebrated in Europe (13th century), whose students once numbered 14,000, coming from all parts of the globe. The cloisters of the two buildings comprised in the university are remarkably elegant, with graceful arches and elaborate moldings. There are numerous other schools, a theater, bull arena, asylums, hospitals, handsome residences and palaces. The most distinguished of the latter are the palaces of the marquis of Valdecarzana and of the counts Garcigrande, Maldenadas, Espinosas and Monterey. There are manufactures of leather, blankets, hats and pottery. In ancient times Salmantica was an important city of the Vettones. In 222 B.C. it was taken by Hannibal, and later under the Goths was a favored city. It was ravaged by the Moors and retaken in 1095. Columbus was lodged (1484–1486) in the Dominican convent here. In 1543 Philip II was married to Mary of Portugal. In 1812 the duke of Wellington gained a victory over the French under Marmont. Pop. (1941 est.) 73,120.

(2) The province of Salamanca has an area of 4,829 square miles, the greater part of which is covered by forests of oak and chestnut. The principal rivers are the Tormes, Douro, Yeltes, Agueda, and the Alagon. There are good harvests of cereals, hemp, oil and wine. Gold is found in the streams, and iron, lead, copper, zinc and coal in the hills, but the mines are only partially developed. The manufactures are unimportant and mainly for home consumption. The cloth of Béjar is especially good. Tanning of hides is a considerable industry. The province is traversed by a railway to Portugal. Pop. (1941 est.) 392,915.

SALAMANDER, săl'ă-măn-dĕr, the name applied generally to the species of tailed amphibians (*Urodela*), but originally to the common European genus *Salamandra*. The smaller strictly aquatic species are known as newts or tritons; some of the larger species have received special names, as congo snake, hellbender, Siren, and water-dog. The remaining salamanders are terrestrial or semi-aquatic and only rarely remain permanently in the water. One Californian species (*Autodax lugubris*) is partly arboreal. They are of small size and lizard-like form; but the popular notion that they are lizards is altogether erroneous as they are strictly batrachian in structure and life-history. The skin is smooth, glandular and scaleless, the skull possesses a well-developed parasphenoid bone and two occipital condyles, and all, except a few terrestrial species, pass through an aquatic gill-breathing stage. Some of the larger aquatic species advance but little beyond this condition; but in the great majority it is larval only and is succeeded by an abranchiate and sexually mature state. The axoltl of the genus *Amblystoma,* is a remarkable instance of a sexually mature larva. Many adult salamanders breathe by means of lungs, but a recent noteworthy discovery is the total absence of lungs in a large proportion of species, in which respiration takes place partly in the skin, but especially by means of a special vascular area of the pharynx. Most of the species deposit their large eggs in water, sometimes in a mass of jelly, as *Amblystoma* (q.v.), sometimes separately or in strings, as *Spelerpes;* but others, like *Desmognathus fuscus* and *Plethodon,* seek drier places beneath stones and guard the eggs, and the terrestrial salamanders of Europe (*Salamandra*) are ovoviviparous. All are carnivorous and subsist upon insects, worms, etc. They are chiefly active at night, and during the day conceal themselves beneath stones and logs. During cold weather they pass into a more or less profound state of hibernation. Owing to the numerous cutaneous glands the skin is always moist and cold, from which arose the remarkable superstition that these animals, which as a matter of fact require abundant moisture to sustain life, have the power not only of resisting, but of quenching, fire. Pliny records that he tried the experiment, and the salamander was burned to a powder; yet the fable continued to be credited till very recent times. From this old belief the name is applied to many articles, and by the ancients to a mythical creature, having fire-resisting qualities. The cutaneous secretion is poisonous to

many of the lower animals. (For a classification of salamanders see URODELA; for development see EMBRYOLOGY). Consult Cope, 'Batrachia of North America' (Washington 1889); Gadow, 'Amphibia and Reptiles' (New York 1901); Phisalix-Picot, Mme., 'Recherches embryologiques, histologiques et physiologiques sur les glands à venin de la salamandre terrestre' (Paris 1900).

SALAMANDER, a kind of gopher (q.v.).

SALAMBA, the native Filipino name for a kind of fishing apparatus, used near Manila, fitted on a raft composed of several tiers of bamboos. It consists of rectangular net, two corners of which are attached to the upper extremities of two long bamboos, tied crosswise, their lower extremities being fastened to a bar on the raft, which acts as a hinge; a movable pole, arranged with a counterpoise as a sort of crane, supports the bamboos at the point of junction, and thus enables the fishermen to raise or depress the net at pleasure. The lower extremities of the net are guided by a cord, which, being drawn toward the raft at the same time that the long bamboos are elevated by the crane and counterpoise, only a small portion of the net remains in the water, and is easily cleared of its contents by means of a landing net.

SALAMIS, săl'a-mĭs, ancient **PITYOUSSA** (Island of Pines), modern **KOLURI,** an island off the coast of Greece, in the Gulf of Ægina, about 10 miles east of Athens. It covers an area of about 30 square miles; is of irregular shape and rocky surface, and separated from the mainland by narrow, winding channels, giving access to the beautiful Bay of Eleusis, which has the appearance of a lake. Its soil is well adapted to the olive, and vineyards thrive. The other chief product is honey. The old city of Salamis stood on the south coast, and the famous naval battle of 480 B.C., between the Greeks and Persians, soon after the great battle of Thermopylæ, was fought in the narrow eastern strait. The new city of Salamis is on the northeast coast. The principal town is Koluri. Solon and Euripides were natives of the old city.

SALAMMBO, să'läm-bō', by Gustave Flaubert, is an attempt to renew, in an age of science and according to the spirit of realism, the historical novel, which in its typical form as created by Walter Scott and practised by his numerous followers was an outgrowth of the romantic temper. It presents a reconstruction of the life of Carthage in the 3d century B.C., utilizing some of the events of the war of the Mercenaries against the Carthaginians as told by Polybius (Book I, last chapter). In preparation for his task he undertook a journey to the scene of his story, studied minutely the records and monuments of old Semitic civilization and sought patiently through familiar acquaintances with the present inhabitants of the region to discover in their life and character clues to the past. To those who impeached the accuracy of his picture he replied at length and in detail, citing authorities and warmly repelling all criticism that hinted either at ignorance or carelessness. But it is not for its erudition that the book has its fame, but for its art. Flaubert was first of all an artist, and if he took great pains to ensure truth in the matter of his work, he took even greater pains to clothe the material in a perfect garment of words. For him, as for all great stylists, there was but one perfect word and one perfect phrase in a given case, and he knew no peace nor rest till he had found it. Salammbô is not a moving tale of adventure, but a series of pictures, rich, full, vivid and exquisitely wrought, in a texture of words that caresses the ear. They have both an intellectual and a sensuous charm. But they are often violent, painful, abhorrent, leaving us oppressed with a sense of the cruelty and mockery of life in Flaubert's pessimistic vision of it. Sainte-Beuve devoted a series of articles to Salammbô in 'Nouveaux lundis' (Vol. V). Flaubert wrote a rejoinder that is to be found in current editions of the novel and in his 'Correspondence,' Vol. II. An English translation was made by M. French Sheldon (London 1886).

ARTHUR G. CANFIELD.

SALANDRA, sa-län'dra, **Antonio,** Italian statesman: b. Lucera, Apulia, 1853. For many years a professor of administrative law at the University of Rome, he entered Parliament as deputy for his native city and early became associated with Baron Sonnino (q.v.) in the «party of constitutional opposition» against the political degeneracy of «Giolittism.» After holding various posts in several cabinets Signor Salandra became Premier in March 1914 on the resignation of Giolitti. During the first months of his administration he was engaged in a severe struggle against the Parliamentary majority controlled by Giolitti. On the outbreak of the European War, Salandra refused the assistance of Italy to Germany and Austria on the ground that the Triple Alliance stipulated co-operation only in case of an attack. The Foreign Minister in his Cabinet, San Giuliano, inclined more toward the Central Powers or at least benevolent neutrality. Nor was the Foreign Minister the only member of the Cabinet to oppose the Premier's policy. With the support of Signor Martini, the Colonial Minister (and a sincere friend of France), Salandra succeeded in overcoming the opposition of his colleagues. He had correctly gauged the temper of the country and the disinclination of the army and navy to fight on the side of Austria. His hands were strengthened by the somewhat opportune death of San Giuliano in October 1914, which enabled him to invite his former chief, Baron Sonnino, to accept the portfolio of Foreign Affairs. Both were resolved from the beginning to cast in their lot with the Allies in due course, though it was necessary first to place the army on an efficient footing and to break the links of economic dependence which bound Italy to the principal partner of the alliance. While Prince von Bülow and other agents of the Central Powers were exerting themselves to influence Italian opinion, the government prepared for the breach. At the instigation of von Bülow the ex-Premier Giolitti endeavored to stir up the king and Parliament to support the German cause, and to bring about the fall of Salandra. These machinations were an open secret and only served to heighten public indignation against the conspirators. Salandra decided on a bold stroke. He tendered his resignation to the king on 13 May

1915. Italy was electrified; enthusiastic gatherings demanded "War or the Republic." It was openly expressed that the king would stake his crown if he yielded. Three days later came the news that Salandra's resignation was not accepted; the demonstrations ceased; Giolitti and the German agents left Rome, and 10 days later Italy declared war. He resigned in June 1916. He was a delegate at the Paris Peace Conference in 1919. He died Dec. 9, 1931.

SALANGANE, săl'ăng-gān, a small swift of the genus *Collocalia,* of southern Asia and neighboring islands, famous as the producer of the edible bird's nests.

SALARY GRAB, in American history, the popular name for the general increase in federal salaries in 1873. The Constitution provides for the compensation of the president, senators, representatives, justices, and federal officers from the federal treasury. The act of March 3, 1873, provided that the president's salary be increased from $25,000 to $50,000, that of the chief justice from $8,500 to $10,500, those of the vice president, cabinet officers, associate justices, and speaker of the House from $8,000 to $10,000, and of senators and representatives from $5,000 to $7,500.

Another act, March 4, 1873, was retroactive as regards the salaries of members of Congress during the previous two years. This, the essence of the "salary grab," excited so much indignation that the laws were repealed, except those affecting the salaries of the president and justices.

SALAWATTI, să-lä-wä't ē, a Melanesian island off the western coast of Netherlands New Guinea, off the northwestern extremity of Papua, from which it is separated by Galewo Strait, covers an area of about 670 square miles. A chain of chalk cliffs, rising to a height of 2,500 feet, skirts the northern coast; the remaining portion is a deep valley covered with virgin forests. Pop. (1930) 1,689.

SALAYAR, SALAJAR, or **SALEIJER,** island, Indonesia, off the southern coast of Celebes from which it is separated by Salayar Strait, 13 miles wide. Salayar is about 50 miles long by eight miles wide. Chief products are pepper, corn, and coconuts. Industries include fishing and salt production. The principal port of the island is Benteng. Pop. (1930) 59,937.

SALDANHA BAY, săl-dăn'yà, bay, South Africa, on the west coast of Cape Province, 60 miles north of Capetown, is a commercial port on the Atlantic, for the western territories of South Africa. It is chiefly of service in the coast trade, and of all the harbors of this seaboard is the only one affording shelter and anchorage at all seasons. It was formerly the chief Dutch naval station in South Africa. During World War II it served as a naval base.

SALE, George, English Oriental scholar: b. supposedly in Kent, about 1680; d. London, Nov. 13, 1736. Little is known of his life except that he was a solicitor in London, and at an early period turned his attention to the study of Arabic and other Oriental languages. In 1726 he began the publication of an Arabic translation of the New Testament for the Society for the Promotion of Christian Knowledge, and was for years engaged in the work of that association. He is best known by his admirable translation of the Koran in 1734, still highly esteemed. He was a contributor to the *Universal History* (1739).

SALE, Sir **Robert Henry,** English military officer: b. Buckden, Huntingdonshire, Sept. 19, 1782; d. Mudki, India, Dec. 18, 1845. He entered the army with an ensign's commission in 1795, was promoted lieutenant in 1797, and in 1798 was ordered to India. He was engaged at Seringapatam, and in 1810 took part in the expedition against Mauritius. In 1813 he was promoted major, and in 1815 he returned to England with his regiment. He served in the expedition against Burma in 1824; in 1838 became brevet colonel and was placed in command of a brigade in the army of the Indus. In the war with Afghanistan which followed Sale played an important part. He became major general in 1840; was in command of the army which stormed Khurd Kabul Pass in 1841 and defended Jelalabad in the siege of 1841–1842. He was knighted for his conduct at Kabul, received the thanks of Parliament for his services in the war, and the decoration of G.C.B. In the Sikh War he was wounded at the battle of Mudki, Dec. 15, 1845, and died three days later.

SALE, in law. See Sales.

SALEM, city, Illinois, Marion County seat; altitude 544 feet; 71 miles east of St. Louis, Mo.; on the Baltimore and Ohio; Chicago and Eastern Illinois railroads, and on the Missouri Illinois Railroad, of which it is a terminus. It is in an agricultural and coal mining region, and in 1939 was the center of an oil boom. It has railroad shops, and manufactures of shoes, underwear, pants, paint, insecticides and lumber. There is considerable trade in timber, dairy products, livestock and fruit. Pop. (1940) 7,319; (1950) 6,159.

SALEM, city, India, in Madras Province, capital of Salem district. It is well built, located in a narrow valley, and subject to sudden and frequent changes of temperature. It has important manufactories of cotton, silk, and cutlery. Mangoes, castor beans, sesame, and peanuts are grown. There are a municipal college, three printing presses, four reading rooms, and an English mission. Pop. (1941) 129,702.

SALEM, district, India, embraces 7,073 square miles and is very hilly, intersected by broad plains. The principal rivers are the Cauvery, with its numerous tributaries. The forests are valuable. Magnetic iron ore is abundant, and there are deposits of corundum and chromate of iron. The chief crops are millet, peanuts, castor beans, sesame, cotton, tobacco, and sugar cane. There are mango groves and mulberry farms. The Cauvery-Mettur hydroelectric and irrigation system furnishes power to the industrial center of Mettur and to the cotton-milling city of Salem. Other important towns are Dharmapuri and Hosur. Pop. (1951) 2,869,226.

SALEM, city, Indiana, county seat of Washington County; altitude 735 feet; 35 miles northwest of Louisville, Kentucky; served by the Monon Railroad, and state highways. It is a productive agricultural community. The first

white settlers came to the county in 1803, and Salem was founded in 1814. It was incorporated as a town in 1854, and as a city in 1936. Government is by city-mayor. Salem is the birthplace of John Hay, secretary of state under Presidents McKinley and T. Roosevelt Pop. (1950) 3,271.

SALEM, city, Massachusetts, one of the three seats of Essex County, is situated at an altitude of 13 feet on a peninsula formed by two outlets of the Atlantic Ocean. It is 16 miles northeast of Boston, and is served by the Boston and Maine Railroad. It is a port of entry, and a United States Coast Guard Air Station is located there. The city has a coastal trade in coal and oil. Manufactures are important and include electric lamps, radio tubes, fine cotton goods, shoes and other leather products, steam valves, chemicals, and mattresses. Several of its earliest colonial houses still stand, among which are the Corwin, or "Witch" House, and the birthplace of Timothy Pickering, built in 1660. Other points of interest are the old courthouse, where the records of the witchcraft trials are preserved; the Pierce-Nichols House, the House of the Seven Gables, the old town hall, and the Salem Athenaeum. The Essex Institute contains a large library, valuable historical collection of relics of colonial days and the witchcraft craze, and a fine collection of old furniture and works of art. The Peabody Museum contains an almost complete Essex County natural history collection, ethnological collections, and models and pictures of ships built in Salem. The city has a public library, 16 public schools, and Catholic parochial schools.

Salem was founded in 1626 by Roger Conant and chartered in 1629, with John Endecott as governor. The Pilgrim church was organized Aug. 6, 1629, with Samuel Skelton as pastor and Francis Higginson as teacher. In 1634, Roger Williams was the minister, but was driven out in 1636. In 1692, witchcraft hysteria broke out there. (See WITCHCRAFT.) In 1774, the first provincial assembly, held there, declared for the independence of the Massachusetts colony; and in 1775, British troops were prevented from crossing the North Bridge in their search for arms and ammunition. Salem furnished more than 150 armed privateers during the Revolutionary War. For a time thereafter, vessels were restricted to coastwise trade; but soon world markets were opened, and at one time as many as 34 Salem ships were engaged in the China trade. The opening of the Erie Canal drew the foreign trade to New York, and Salem's shipping glory vanished. Salem was incorporated as a city in 1836. The city government is vested in a mayor and 11 councillors. Pop. (1950) 41,842.

SALEM, city, New Jersey, seat of Salem County, is situated at an altitude of 16 feet on the navigable Salem Creek near its confluence with the Delaware River. It lies 39 miles southwest of Camden, and is on the Pennsylvania Railroad and modern highways. Its manufactures include canned food products, glass, and floor coverings. It was founded as a Quaker colony by John Fenwick in 1675. The Friends Burial Grounds date from 1676. The Friends Meeting House, still in use, was built in 1772; and the public library was established in 1804. Salem was incorporated as a village in 1695, and as a city in 1858. It has a mayor-council government. Pop. (1950) 9,077.

SALEM, city, Ohio, located in Columbiana County, at an altitude of 1,230 feet; 69 miles southeast of Cleveland, on the Pennsylvania Railroad and modern highways. Its manufactures include automobile bodies, china and porcelain products, machinery and machine parts, and electric furnaces. It has a public library. An attractive residential city, founded by Quakers from Salem, N. J., in 1806, it was incorporated as a village in 1830 and as a city in 1887. It has a mayor-council government. Pop. (1940) 12,301; (1950) 12,683.

SALEM, sā'lĕm, city, Oregon, is the capital of the state and seat of Marion County. It is situated in northwestern Oregon on the east bank of the navigable Willamette River, about 50 miles (by highway) southwest of Portland. Salem lies at an altitude of 171 feet, is traversed by two creeks, and embraces an area of more than nine square miles.

Transportation.—The city is served by the Southern Pacific Railroad, Oregon Electric Railways, and a number of motorbus and truck lines. For air transportation of passengers, express, and freight, United Air Lines serves McNary Field, Salem's municipally owned airport.

Industry and Business.—Salem lies near the center of the fertile Willamette Valley which yields to rolling hills, and timbered uplands. It is the chief marketing center and distribution point for Marion and Polk counties, whose adjoining boundary line it overstrides. Among their leading crops are filberts, hops, vetch, long fiber flax, berries, and orchard fruits. The production of livestock and of seed, mushrooms, and other specialty crops, is also important. Salem has a dozen large canneries, quick freeze and cold storage plants, and plants for processing meat, feed, seed, and nuts. Textile mills manufacture such products as rugs, linen cloth, mops, insulation materials, and twine. Other manufactures are wooden boxes, furniture, and novelties; pulp and paper products, and machinery and metal products.

Government.—The city government is the council-manager type. The mayor and councilmen are elected on nonpartisan ballots. In addition to the airport, the sewage treatment plant and the waterworks are owned and operated by the city.

Educational, Cultural, and Recreational Facilities.—Besides the city's public elementary and high schools, other educational facilities include parochial schools, the Sacred Heart Academy (Catholic, coeducational) and Salem Bible Academy (coeducational and nondenominational), Willamette University (the oldest institution of higher learning in the Pacific Northwest); and the state schools for the blind, the deaf, the feebleminded, and the Hillcrest (state) Industrial School for Girls. The city has 54 churches in which 37 denominations are represented. The Salem Public Library contains nearly 60,000 vollumes; and the Oregon State Library has a large collection of photographs, books, pamphlets, and documents, among which is a special historical collection. Willamette University houses the Northwest History Collection of valuable historical manuscripts and documents, and collections of Indian relics, flora, fauna, and minerals. The city has several parks. The smallest is but 150 square feet and contains a single sequoia tree, planted in 1872; the largest (Bush Pasture

Park) covers 100 acres of land and has within it recreational facilities for children, and McCullough Stadium which is used by the university. On the capitol grounds and adjoining Wilson Park are more than 400 varieties of trees, many of historic interest. Salem has a ball park seating 5,500 people.

Buildings and Other Points of Interest.—The Oregon State capitol (1938) is an unusually striking and harmonious building of white Vermont marble in modern design, of which Francis Keally was the architect. Its cylindrical dome is surmounted by *The Pioneer,* a sculptured figure in heroic size by Ulric Ellerhusen. Near the entrance of the capitol is Alexander Phimister Proctor's bronze statue, the *Circuit Rider,* a memorial to Robert Booth, one of the itinerant preachers who served Oregon's pioneer settlements. Within the capitol, the history of the state is depicted in murals by Barry Faulkner and Frank H. Schwartz. The Oregon State Library is also modern in style. Gabriel Lavare executed the wood carvings of historical scenes over its three entrance doors, and also a decorative medallion (*Mother and Child*) in the lobby. The Oregon Public Service Building, completed in 1950 at a cost of $2,000,000, is a simple, five-story set-back structure finished in marble like that of the capitol, to which it is connected by underground tunnels. The oldest building still standing was once the home of Jason Lee.

History.—In 1833, Jason Lee was chosen in the East by the missionary society of the Methodist Episcopal Church to head a group for the conversion of the Flathead Indians north of the Columbia River. Arriving at Fort Vancouver, he was persuaded to locate in safer country. The following year he established a mission station and school north of the present city of Salem; but the site proved unhealthful, and in 1840 it was moved 12 miles to the south. That year, along a creek in what is now within Salem's boundaries, the missionaries set up a sawmill and gristmill. The following year (1841), they erected a building to serve as an Indian manual training school on what is now the university campus. Lee died in 1845. Christianizing the Indians began to be regarded as hopeless. In 1846, one of the missionaries was authorized to establish a townsite on the land; and in 1848, a town was laid out and lots were bartered for wheat. Growth was slow, the gold rush of 1849 diverting immigration from Oregon and even drawing off many of the people who had settled in and around Salem. In 1851, the legislature voted to make Salem the Oregon territorial capital. In 1852, only about a half dozen families were living there. In 1855 its newly erected capitol was destroyed by fire. Nevertheless, Salem was beginning to grow and prosper. In the 1850's it was connected with other settlements in the valley by stage, river steamer, and telegraph, and the first woolen mill in Oregon was opened there. Salem was incorporated as a city in 1860, and was made the permanent capital of the state four years later. In 1861, however, its development was halted by a disastrous flood, and not until after the railroad reached it in 1871 did growth begin again. In Salem there are reminders of its pioneers, as, for example, in the university which started as the Oregon Institute and traces its history back to 1842; but much of the characteristics and growth of the present city date from the 1900's.

Population.—In 1870, Salem's population was 1,139. The following figures indicate its growth in the 1900's: (1900) 4,258; (1920) 17,679; (1940) 30,908; (1950) 43,140.

SALEM, town, Virginia, is the seat of Roanoke County. It lies at an altitude of 1,076 feet, on the Roanoke River, in the Blue Ridge Mountains, 7 miles west of Roanoke. It is on the Norfolk and Western and the Virginian railroads, and state and federal highways. It is an established summer resort, and manufactures machinery, medicines, elevators, brick, clothing, and furniture. In it are Roanoke College, the Lutheran Orphanage Home of the South, and the Baptist Orphanage of Virginia. It was founded by James Simpson in 1802 on land from a grant made to Gen. Andrew Lewis in 1761. Government is by council and manager. Pop. (1950) 6,823.

SALEMI, city, Sicily, in the Province of Trapini. Elevation, 1,450 feet. It contains the ruins of an old castle, and a library and technical school. There is trade in cattle, grain, wine, and oil. Pop. 17,308.

SALEP, a demulcent drug, consisting of the tubers of certain orchids (*Orchis mascula* and *O. morio*). These tubers are prepared in central and southern Europe and in the Levant. They are dug up as soon as the flower stalks decay, and are dried. Otaheite, or Tahiti, salep is a starch made from the *Tacca pinnatifida* in the Pacific islands.

SALERATUS, aerated salt; originally potassium bicarbonate, an imperfectly carbonated salt. The name is now commonly applied to sodium bicarbonate, which is used to neutralize acidity and for raising dough. It is a common constituent of baking powders.

SALERNO, sä-lûr'nō (Ital. sä-lĕr'nô), Italy, (1) seaport and capital of the Province of Salerno, 32 miles southeast of Naples. It stands upon a slope whose summit is crowned by the ruins of an ancient citadel, and is surrounded by a massive stone wall. The streets are lava-paved. A cathedral (1076) of Gothic architecture is adorned with a portico of porphyry and Corinthian pillars from Paestum, the ruins of which are nearby. Here are the tombs of Margaret of Anjou and Gregory VII. Other edifices are the governor's palace, hospitals, churches, convents, a seminary, and a lyceum. The chief industries are cotton and silk spinning and printing. Among manufactures are glass, ceramics, macaroni, iron and leather goods, thread, and linen. Founded by the Greeks, Salerno became an important city under the Romans, passing into possession of the Goths, the Lombards, and the Normans successively. Of the ancient city of Salernum are still to be seen temples, an amphitheater, and a theater. In the medieval period, it was celebrated for its school of medicine. It was annexed to the kingdom of Naples in the 1800's. Pop. (1948) 67,009. (2) The province has an area of 1,901 square miles. It is in southern Campania on the Tyrrhenian Sea. In it, the chief spurs of the Apennines are the Cervati, Polveracchi, Alburno, and Sacro; its principal streams, the Tusciano, Mingardo, and Alerto. Its chief products are wheat, corn, flax, olives, figs, wine, and fruit. Pop. (1936) 705,277. (3) The Gulf

of Salerno, or Gulf of Pæstum, is a semi-circular indentation of the Mediterranean Sea, separated from the Bay of Naples by Point Campanellas. On its shores stand the picturesque and interesting towns of Amalfi and Salerno and the ruins of ancient Pæstum (q.v.).

SALERNO, School of (*Schola Salernitana*), a medical school at Salerno, Italy, famous in the Middle Ages, and important not so much for its contributions to medical knowledge as for its services in retaining the knowledge already possessed, through a period when all branches of learning were suffering decline, and forming a connection between ancient and modern medicine. As early as the 7th century some of the prelates of the Benedictine monastery at Salerno were famous for medical as well as other learning; but the school, or group of schools of medicine, which came into existence at Salerno was secular in character, the wives and daughters of the professors were often deeply learned and acted as teachers, and law and philosophy were taught as well as medicine. The school was at the height of its glory from the 9th to the 13th centuries; but from that time its decline was steady, owing to the more rapid advancement of other schools. At the zenith of the school's fame the city was known as *Civitas Hippocrates,* and it attracted many famous personages, among them William of Normandy, later Conqueror of England. The teachings of the school are fairly represented by existing works, but these are chiefly compilations founded on the teachings of Hippocrates and Galen. Such advances in knowledge as the school made were those of practical experience; and while a considerable knowledge of drugs was possessed at Salerno the treatment administered was in the main dietic. Anatomy they disregarded almost wholly. The medical school was dissolved by an edict of Napoleon in 1811, and the other departments closed in 1817.

SALES, sālz or säl, **Saint Francis de.** See Francis de Sales, Saint.

SALES. A sale is a contract by which property is transferred for a price in money. Usually the term is restricted to the sale of personal property. A sale is differentiated from other transfers of property by the fact that it is of the general or absolute ownership and by the further fact that it is for a price. A contract to sell, also called an executory contract of sale, is a contract by which the seller is to transfer property to the buyer for a price which the latter pays or agrees to pay. A contract of sale may be absolute or conditional.

To constitute a valid sale, there must be, as in all contracts, competent parties and mutual consent. In addition, there must be a subject matter to be sold and a price or consideration in money. If the price exceeds a specified amount, the contract of sale, to comply with the Statute of Frauds, must generally be in writing unless there is a part payment or some of the goods are delivered and accepted. A contract for the sale of goods not yet acquired by the seller is construed to be a contract to sell. If parties agree upon a sale, but do not fix the price, the law implies a reasonable price. The acceptance of an offer to buy or sell may be expressed or implied. Many questions of real difficulty arise in the law as to when title passes to the buyer, and the determination of the question is important in the law of insurance, liens, etc. Where a contract of sale provides that the buyer may return the goods or pay the price, the property in the goods ordinarily passes to the buyer subject only to a defeasance by the return of the goods. Under a completed sale of goods the title passes from the seller to the buyer immediately, at the place where the contract is completed. The intention of the parties controls if the sale is of specific or ascertained goods and this may be shown either by circumstances or declarations. If by the terms of the agreement any condition is to be performed or any material act to be done, as to identify the goods, the title generally does not pass until such act is performed. A sale on trial or approval is held to be a sale upon a condition precedent and the contract is executory, the title passing only after the buyer has accepted the goods.

Conditions are distinguished from warranties generally in that the former constitute the basis of the contract on a breach of which the parties may treat the contract as terminated, whereas a warranty is merely a collateral undertaking. Warranties are of two kinds: express and implied. Formerly the harsh rule of *caveat emptor* was applied to sales, but to-day the law protects the buyer by implying various warranties in contracts of sale. Generally speaking, an implied warranty arises on sales as to merchantability, title, fitness for purpose intended and that the goods shall fill the requirements of the contract, but not as to quantity, quality or value. See Contract; Warranty.

The law of sales in England and Ireland has been much simplified by the Sale of Goods Act, passed in 1893. The law of Scotland differs somewhat from that of England as to distinctions between conditions and warranties and as to the application of the Statute of Frauds in relation to sales.

An effort has recently been made in the United States to simplify the law of sales by codification, and up to June 1917 this effort had met with substantial success by the enactment of the Uniform Sales Act in no less than 18 States of the Union.

Edward F. Donovan.

SALESIAN FATHERS. See Orders, Religious.

SALESMANSHIP, The Psychology of. The salesman like the advertiser must influence the minds of men. He must influence men to buy goods and to buy his particular goods. Serving in such a capacity a knowledge of the fundamental principles of psychology will generally add to his effectiveness. He, too, must know when and how to make use of argument, when to appeal to this motive and when to that one. He must know that in most acts of deliberation there is a point when the occurrence of an apparently insignificant idea will swing a possible customer to favorable or unfavorable action and he must respond to that situation with the suggestive word destined to close his sale.

That the sales world recognizes the importance of psychological knowledge as a part of each salesman's equipment is clearly shown

by the increasing number of books and articles intended to show how psychological fact may be used in increasing selling efficiency. Besides this there are growing up all over the country public and private sales schools and sales schools conducted by business organizations for their employees, all of which are teaching with varying degrees of success a new science of salesmanship which has as its basis the elementary principles of psychology.

The opinion is also spreading that not alone the salesman but also the man who employs him, needs psychological knowledge. The modern salesman is frequently given a thorough course of training before he is sent out to visit the customers of his firm or possible customers of his firm. Now modern educational methods rest upon a distinctly psychological basis, so he who would train men in a sales school must, like any other teacher, familiarize himself with educational psychology in certain aspects, at least, if he would make the most of the training period of his men.

Then there is another highly important application of psychology to the problems of the selling organization. The methods of selecting the sales force have been and are still in many instances of a surprisingly hit or miss character. As a new development, psychologists are being called in by certain progressive concerns to standardize their methods of selecting men. While the science of mental measurement is still in a comparatively undeveloped stage, certain facts regarding a man can be determined, with a fair degree of accuracy, by means of mental tests. For example, mental tests will give a strong indication of the general native intelligence of a man. This fact alone will not of course give complete information as to the selling ability of an applicant, but, all things considered, the greater native intelligence a man has the more likely he is to succeed in a selling position. So, when taken as additional information about an applicant, the information secured from such tests is highly valuable.

Psychological investigations into the problems of character traits, the judgment of such traits and their bearing upon specific lines of work are bringing out further results of great utility for the sales manager. In short, the sales organization, like all other organizations so intimately concerned with the modes of human thought and action and with the differences which we know exist between one man and his neighbor, is sure to reap increasing benefits from the modern efforts of psychologists to work out practical solutions for the problems of the human failures and misfits.

WALTER DILL SCOTT,
President Emeritus, Northwestern University, Evanston, Illinois.

SALFORD, sôl'fĕrd, city and county borough, England, in Lancashire, on the Irwell River, which separates it from Manchester. On the Manchester Ship Canal, it has important docks. It is a large industrial town, closely associated with Manchester, and is a textile center for cotton manufacturing. Steel, shoes, automobile tires, chemicals, dyes, and soap are produced. The borough includes Trafford Park, an experimental industrial area founded in the 1930's. Pop. (1951) 178,036.

SALGIR, sŭl-gĕr', river, Russia, longest in the Crimea. The Salgir rises seven miles northwest of Alushta in the Chatyr-Dag, passes Simferopol and Nizhnegorski and, at the end of a 100-mile course, empties into Sivash, a salt lagoon.

SALGOTARJAN, shŏl'gō-tŏr-yän, city, Hungary, 53 miles northeast of Budapest on a branch of the Zagyva River. One of the leading coal and lignite mining centers, it also has important manufactures. Pop. (1941) 20,318.

SALIC LAW, să'lĭk, originally a penal code of the Salian tribes, later a name given to a rule excluding women from inheriting the crown of France. This Frankish tribe founded the French monarchy in the 5th century, but did not exclude women from the crown, only from inheriting land. The Salic laws were familiar to Charlemagne, who had them emended in the 9th century. The "Salic law" was first confirmed by France as a law of regal descent when Louis X (r. 1314–1316) died without a male heir and his brother Philip V (r. 1316–1322) was proclaimed king by the Assembly. The law was adopted by Spain in the time of Philip V (r. 1700–1746) and led to a revolt by the Carlists when the Cortes set aside the law to make Isabella II queen (r. 1833–1870). The German states also had this law and when Queen Victoria ascended the English throne (1837) it involved the separation of Hannover from England.

SALICORNIA, săl-ĭ-kôr'nĭ-ă, plant, genus of the Chenopodiaceae family, growing in saline soils. It is a succulent herb, so brittle as to be called glasswort, and grows over such large areas of marsh lands that when its usual green hue turns to red in the autumn it forms great patches of brilliant color. The common name is marsh samphire.

SALICYLIC, săl-ĭ-sĭl'ĭk, **ACID AND RELATED COMPOUNDS.** Salicylic acid is orthohydroxybenzoic acid, $C_6H_4(OH)(CO_2H)$. It occurs as the free acid in the plant known as meadowsweet (*Spiraea ulmaria*) and as its methyl ester in oil of wintergreen. The glucoside, salicin, may be broken down into glucose and saligenin (orthohydroxybenzyl alcohol), the latter yielding salicylic acid on oxidation.

Salicylic acid is a white crystalline solid melting between 156° and 159°C. It is sparingly soluble in water but quite soluble in alcohol and ether.

This acid is produced commercially from phenol (carbolic acid), caustic soda, and carbon dioxide. Phenol is converted first to sodium phenate in a hot solution of sodium hydroxide. The phenate is dried and heated with carbon dioxide under pressure. The resulting sodium salicylate is dissolved in water and color is removed by activated carbon, after which the acid is liberated by hydrochloric acid.

Salicylic acid is an antiseptic and disinfectant, particularly in ointments. It is quite effective against fungi. Its use is now generally prohibited in foods. Salicylic acid is employed mainly in the manufacture of dyes, pharmaceuticals, and fine chemicals.

Sodium Salicylate is classed as an analgesic and antipyretic, and is also an antiseptic and an intermediate in chemical synthesis. Its annual production is of the order of 800,000 pounds per year.

Methyl Salicylate, $C_6H_4(OH)(CO_2CH_3)$, occurs naturally as "oil of wintergreen," but is generally obtained by the action of methanol on salicylic acid. It is used in pharmaceuticals and mainly as a flavoring agent. Around 2,500,000 pounds of this chemical are made yearly.

Phenyl Salicylate, $C_6H_4(OH)(CO_2C_6H_5)$, is also known as salol. It is a white crystalline solid melting at 43°C. and sparingly soluble in water. Once employed as a medicinal, it is now primarily a commercial chemical, functioning as a preservative and plasticizer in vinyl and cellulosic ester plastics. Its value as a pharmaceutical was once considered to lie in its property of passing through the stomach and later dissolving in the small intestine, where it broke up into salicylic acid and phenol. Small amounts of it were also employed in coating enteric pills because of this same property of delayed solubility. It has been replaced by less irritating and more dependable drugs. It finds limited use in sun creams because it is relatively impenetrable by ultraviolet, and it is also an ingredient along with a plastic in a volatile liquid, a thin waterproof protective layer being formed over minor cuts and abrasions on evaporation of the solvent.

Acetylsalicylic Acid, $C_6H_4(O_2C\text{-}CH_3)(CO_2H)$, known to the general public as *aspirin,* is probably the largest single outlet for salicylic acid. The term is derived from an old name for the free acid, which was originally obtained from spiraea. Aspirin is made by the action of acetic anhydride and acetic acid on salicylic acid.

Other organic compounds related to salicylic acid are as follows.

Salicin, a naturally occurring glucoside, which breaks up into orthohydroxybenzyl alcohol and glucose.

Saligenin, $C_6H_4(OH)(CH_2OH)$, or orthohydroxybenzyl alcohol, is used as a medicinal and is also regarded as being formed in the first step in the manufacture of plastics from phenol and formaldehyde.

Salicylaldehyde, $C_6H_4(OH)(CHO)$ is made by the action of chloroform and caustic soda or phenol. It is used in organic synthesis, and as an analytical reagent.

Salicylamide, $C_6H_4(OH)(CONH_2)$, is an external antiseptic and fungicide in soaps, salves, and lotions.

W. T. Read.

SALIDA, sȧ-lī'dȧ, city, Colorado, and Chaffee County seat; altitude 7,050 feet; 96 miles northwest of Pueblo; on the Denver and Rio Grande Western Railroad. It is the center of a mining region where gold, silver, and lead are the principal ores. A railroad division point, it has railroad shops; granite finishing, creosoting, and the working of sheet metal are other industries. Agriculture in the surrounding area includes dairy and poultry farming and the growing of grains. Medicinal hot springs in the near-by mountains have made the city known as a health resort.

Salida is in the heart of the Rocky Mountains and has some of the finest mountain scenery in the West; on one side is the crest of the Continental Divide, and on the other the Sangre de Cristo Range. Salida was established by the Denver and Rio Grande Railroad in 1880, and the railroad maintains a modern hospital in the city. Pop. (1950) 4,553.

SALII, sā'lī-ī, priests of Mars in ancient Rome, so called from the Latin word *salire,* to leap and dance. Numa fixed their number at 12; Tullus Hostilius added another 12, who were called Salii Collini. Their origin is thus accounted for by the Romans: In the time of Numa, Rome was desolated by a pestilence, which ceased when the gods let fall from heaven the "ancile" (a shield of a peculiar form). The soothsayers declared that this shield was the sign of the perpetuity of the Roman power, and advised that 11 others should be made similar to it, so that the true ancile could not be so easily purloined. This advice was followed. On the 1st of March every year when the Salii offered sacrifices to Mars they carried the shields about the city, clashing them together, executing warlike dances and singing the Salian hymns—ancient songs in praise of Mars and the other gods, and of distinguished men, particularly of Mamurius, who made the 11 shields. The dress of the Salii was a purple tunic embroidered with gold, and bound with a brazen belt, and a toga with a purple border. On their head they wore a high cap in the form of a cone, with a sword by their side, a spear or rod in their right hand and an ancile in their left. None but patrician youths whose parents were alive could be admitted among the Salii.

SALINA, sȧ-lī'nȧ, city, Kansas, and Saline County seat; altitude 1,220 feet; on the Smoky Hill River; 119 miles west of Topeka; on the Union Pacific; Missouri Pacific; Atchison, Topeka and Santa Fe; and the Chicago, Rock Island and Pacific railroads. There is a municipal airport. Salina is the metropolis of the Kansas hard wheat region. Flour milling and the processing and packing of foods are foremost among the city's industries. Manufactures include farm implements, cement, bricks, canvas, tiles and foundry products.

Salina has a public library and a county historical museum, and is the seat of Kansas Wesleyan University (q.v.), coeducational, with library and museum; of Marymount College, Catholic, for girls; and of a military school for boys. The municipal auditorium is a war memorial, accommodating more than 3,000 persons. An art association contributes to the cultural assets of the community. Saline County was organized and settlement at Salina was effectively begun in 1859. After the Civil War came the railroads and the beginning of the modern development of the city. It has commission government, with city manager. Pop. (1950) 26,176.

SALINA CRUZ, Pacific seaport, Mexico, in the State of Oaxaca, 12 miles south of Tehuantepec, on the Tehuantepec Railroad, of which it is the southern terminal. It has a fine harbor and steamship connection with many foreign countries. Pop. (1950) 8,243.

SALINA FORMATION, or **SALINA STAGE,** in North American geology an important group of beds, belonging to the upper part of the Silurian series, named from a township in Onondaga County, New York, where salt springs, issuing from this formation, were discovered in the 17th century by the Jesuit missionaries. The formation, which consists mainly of shales, with frequently extensive salt and gypsum beds, comes to the surface in an east and west belt extending from Herkimer County, New York, westward across the Niagara River into Canada. Its erosion has caused a belt of low, often swampy, country, averaging from 8 to 15 miles in width, which is followed by the Erie (New York State Barge) Canal and the New

York Central and other railroads. The formation extends across Canada, where its outcrop is chiefly drift-covered, into Michigan.

SALINAN, sä-lē'nän, **INDIANS,** a linguistic family of North American Indians formerly inhabiting parts of San Luis Obispo, Monterey, and San Benito counties, California. The stock is now represented by only a score of individuals.

SALINAS, city, California, situated in the central region of California 9 miles from Monterey Bay in the 100-mile long Salinas River Valley. It is the county sea of Monterey County, and lies between the Gabilan and Santa Lucia Mountains. It is served by the Southern Pacific Railway and the Pacific Greyhound Lines.

The Salinas Valley is one of the richest agricultural regions in the United States. Its principal crops are lettuce, broccoli, celery, artichokes, sugar beets and dried beans. It is the center of a large bulb and seed industry. Salinas was settled in 1858, became the county seat of Monterey County in 1872, and was incorporated as a city in 1874. The famous California rodeo is held in Salinas each year. Pop. (1950) 16,283.

SALINAS, river in western California. It rises in San Luis Obispo County and flows northwesterly 150 miles to enter Monterey Bay.

SALIS, zä'lĭs, **Johann Gaudenz,** Baron von Salis-Seewis, Swiss soldier and poet: b. Bothmar Castle, near Malans, Grison, Dec. 26, 1762; d. there, Jan. 29, 1834. Going to France he joined the Swiss Guards (1779) and was adjutant to Masséna during the Revolution. Influential in Swiss politics after 1793, he was inspector general of the army, 1798–1817. His collected poems *Gedichte* (1793) achieved wide popularity.

SALISBURY, Robert Arthur Talbot Gascoyne-Cecil, 3d Marquis of. See Cecil.

SALISBURY, sôlz'bĕr-ĭ, **Rollin D.,** American geologist: b. Spring Prairie, Wis., Aug. 17, 1858; d. Chicago, Ill., Aug. 15, 1922. From 1892 he was professor of geographic geology at the University of Chicago. He was recognized as an authority on glacial and Pleistocene deposits. With Thomas Chrowder Chamberlin he wrote *General Treatise on Geology* (1906).

SALISBURY, town, Connecticut, in Litchfield County on the borders of New York and Massachusetts; there is freight service on the New York, New Haven and Hartford Railroad. It is a center for winter sports and summer music festivals. The first tax-supported library in the United States is that at Salisbury, which was organized in 1803 from one established by the Library Association in 1771. The town was settled in 1719 and incorporated in 1741. From 1732 until the end of the 18th century it was an important iron-mining center. Pop. (1940) 3,030; (1950) 3,076.

SALISBURY, city, Maryland, geographical and business center of the Delmarva Peninsula which lies between Chesapeake Bay and the Atlantic Ocean, 103 miles south of Wilmington, Delaware, on the Pennsylvania Railroad. It is the county seat of Wicomico County, altitude 23 feet. Salisbury is in a rich agricultural region which is also the largest poultry (broiler) raising section of the world. Commercial crops include extensive shipments of strawberries, cucumbers, cantaloupes, white and sweet potatoes, and other fruits and vegetables. Most important manufacturing establishments engage in production of frozen and canned foods, gasoline pumps, apparel, furnace and foundry products, fish fertilizer, bricks, building materials. A state teachers college is here. Salisbury was founded in 1732 by act of the Provincial Assembly of Maryland. Pop. (1950) 15,109; (including suburbs) 18,000.

SALISBURY, city, North Carolina, Rowan County seat; altitude 764 feet; located 42 miles from Charlotte, 40 miles from Winston-Salem, on important federal and state routes. Served by main line of Southern Railway; location of largest less-than-carload freight shipping center in Southeastern states. The economy is highly industrialized, with more than 100 diversified plants in the community. Crops are diversified, dairying is a leading activity. The city has two colleges, Catawba for white, and Livingstone for colored students.

Founded in 1753, the city was named for Salisbury, England. Adjacent to Salisbury's city limits are the incorporated towns of Spencer and East Spencer, the three municipalities having a combined population of 25,676 (1950).

SALISBURY, capital of Southern Rhodesia, southeast Africa, in Mashonaland Province 240 miles northeast of Bulawayo. Fort Salisbury, in the vicinity, was built in 1890, and the municipality was created in 1897. Salisbury is the center for a number of gold fields and for a rich agricultural and stock raising region. Pop. (1946) 69,100.

SALISBURY or **NEW SARUM,** sâr'ŭm, municipal borough, England, in Wiltshire, on the Avon 22 miles northwest of Southampton. Most conspicuous among the public buildings is the splendid cathedral, dating from 1220, one of the grandest and most interesting examples of Gothic architecture in England. The building is 473 feet in length, and the width of the nave is 82 feet. It is in the form of a double cross, with a graceful and exquisite interior, and has a spire, 404 feet in height, which is the highest in England. Notable for its perfect proportions and the uniformity of its style, the cathedral's features include cloisters, chapter house, lady chapel, and library. Two miles north of Salisbury are scanty remains of Old Sarum, known to the Romans as *Sorbiodunum,* which became the home of kings of Wessex; about 1075 a bishopric was established there, and in the 13th century the see was transferred to New Sarum. Pop. (1945) 30,550.

SALISHAN, sā'lĭsh-ăn, **INDIANS,** a linguistic stock of North American Indians comprising a large number of tribes or bands, most of them insignificant in numbers, the original habitat of which included the southern half of British Columbia, most of Washington, and parts of Oregon, Idaho, and Montana. The tribes were visited by Juan de Fuca (1592), by the Spanish navigators who later explored the coast, by George Vancouver (1792–1794), and by Lewis and Clark (1804–1806), who, in their narrative of the expedition (1814), gave the first

definite information regarding them. The fur-traders penetrated their country early in the 19th century and while Astoria, at the mouth of the Columbia, was not founded within their immediate territory, its establishment formed the beginning of the change in the primitive condition of the Salishan and the surrounding tribes which perhaps reached its climax soon after the establishment of the trading post at Victoria, British Columbia., in 1843. In their habits and customs the Salishan Indians may be divided into the coast and the interior groups. Among the former, at least, the gentile system is recognized, descent being in the male line; their houses are long communal structures, built of puncheons and designed to accommodate several families, each with its own fire. Sea products formed their chief sustenance; the canoe played an important part in their daily life; slavery was practised, and the *potlatch,* a curious institution which consisted of elaborate feasting and the distribution of personal property, held sway to such an extent as frequently to impoverish the most progressive members of the tribe. The interior Salishan tribes hunted and fished for salmon in the many streams that drain their former territory. Their houses, unlike those of the coast, were conical and constructed of poles covered with grass, pine-needles, bark and earth. The custom of head-flattening was practised particularly among the coast Salish, but, strange as it may seem, this habit did not prevail among those members of the stock now designated by the name «Flatheads.» There are many tribes or sub-tribes of the Salishan stock in Washington, Montana and British Columbia, numbering in all about 18,500 individuals, of whom about 8,000 are within the limits of the United States. The principal Salishan tribes within Canadian territory are the Lillovet, Okinagan, Thompson Indians and Lhuswap. Of the population of the Canadian divisions of the stock little reliable information is obtainable, as many tribes or tribal divisions are assembled on each of several reservations, only the combined population of which is known. These are distributed as follows: Fraser River Agency, about 5,000; Kamloop's Agency, about 2,600; Cowichan Agency, about 1,850; Okinagan Agency, 950; Williams Lake Agency, 1,900; Kootenay Agency, 50. The principal Salishan tribes or bands on reservations in the United States are:

Colville Agency, Washington.— Cœur d'Alêne (Skitsuish), 474; Colville, 296; Kalispel or Pend d'Oreilles, 150; Lake or Senijextee, 307; Spokane, 653; Okinagan, 575; Sanpoil and Nespelim, 400, making a total of 12,350.

Puyallup Agency, Washington.— Chehalis, 156; Georgetown, Humptulip, Quaitso and Quinaiel, 324; Nisqualli, 107; Puyallup, 536; Skallam or Clallam, 317; Skokomish, 165; Squaxon, 118.

Tulalip Agency, Washington.— Lummi, 340; Muckleshoot (collective), 148; Port Madison, 150; Swinomish, 313; Tulalip, 488.

At Large in Washington.— Nooksak, 200; Piskwans or Wenatchi, 166.

Flathead Agency, Montana.— Charlot's band of Flatheads, 157; Confederated Flatheads, Pend d'Oreilles and Kootenai, 1,310; Lower Kalispel or Pend d'Oreilles, 53; Spokan, 77.

Since the above statistics were published many of the younger Indians have left the reservations and gone into civilized life, which has reduced those remaining on the various agencies to over 10,000 in Canada and over 8,000 in the United States. Consult Curtis, E. S., *Indian Days of the Long Ago* (Yonkers 1914); Farrand, L., *Basket Designs of the Salish Indians* (New York 1900); Trey, A., *Von Salis-Seervis* (Frauenfeld 1889); Hill-Tout, C., *British North America* (London 1907); Hodge, *Handbook of American Indians* (Washington 1910); Pöder, G. W., *Der Dichter Johann Gaudenz von Salis-Seervis* (Saint Gall 1863); Smet, P. J. de, *Letters and Sketches* (Philadelphia 1843).

SALIVA. See Salivary Glands.

SALIVARY GLANDS, the glands which secrete saliva, the fluid of the mouth, or spittle. By means of these secretions the food in the mouth is brought to a pulpy state, and through the chemical action of saliva certain changes are effected in the constituents of the food. In man the salivary glands comprise three pairs, as in the mammalian class generally. Of these the largest is the parotid gland, lying in front of the ear, before the mastoid process of the temporal bone, and behind the ramus of the lower jaw. Its duct is the parotid duct, or duct of Steno. It opens into the mouth opposite the second upper premolar tooth. This gland measures from two and one-half to three inches in length, and is supplied with blood by branches from the main trunk of the external carotid artery, from the temporal, facial and other blood-vessels. The nerve supply is chiefly derived from the vegetative nervous system. The submaxillary gland, next in size, is in the lower portion of the lower jaw, above the digastric muscle. Its duct (Wharton's duct) is about two inches long, and its arteries and veins are derived from the facial and lingual vessels. The third distinct salivary gland, the sublingual, is still smaller, and is situated on the floor of the mouth, beneath the front part of the tongue. It is from one and one-half to two inches through its long axis. Its numerous ducts open on the floor of the mouth by many minute apertures. The excretory ducts of subsidiary glands in the mouth open simply on the mucous membrane of the mouth. The minute or microscopic structures of the salivary glands are composed of lobes in turn composed of lobules, each of which contains a small branch of the main duct of the gland, the subdivisions of which ultimately terminate in minute vesicles or sacs, known as acini. The salivary fluid as found in the mouth is usually mixed with the mucus secreted by the mucous or lining membrane of the mouth, and is thus rendered of viscid consistence.

Salivary glands are absent in some mammals, as whales; in some reptiles, as crocodiles; and in most fishes. In mammals alone salivary glands are present of the definite structure seen in man; but in many reptiles, as in serpents, definite (buccal) glands exist, within the inside margin of the jaws. In birds the submaxillary glands may be of large size; and in some forms, as woodpeckers, the saliva may be normally of a viscid consistence, adapted for smearing the tongue, and for thus aiding in the capture of insect-prey. Swifts, as is well

known, secrete in their salivary glands a glutinous substance of which in great part, often almost wholly, they build their nests. (See Birds' Nests, Edible).

When first secreted, saliva gives an alkaline reaction. During digestion this alkaline condition persists. During fasting saliva gives a neutral reaction, as also when slowly secreted, its alkalinity then being neutralized by the acid of the mucus of the mouth. Microscopically examined, saliva shows minute solid particles, probably derived from the secreting structures; and when mixed with the fluids of the mouth it contains also epithelial scales from the mouth and tongue, and mucus corpuscles, mostly from the tonsils. Freed from these, the saliva is a fluid either colorless or bluish-gray.

During mastication the flow of saliva is greatly accelerated, the presence of food in the mouth acting as the stimulus to its secretion; and different foods affect the secretion in different degrees; while mental impressions, without the presence of food, will cause saliva to flow, or will "make the mouth water." Under the action of different branches of the vegetative nervous system the secretion may be thin and watery, or thick. It is constantly subject to mental impressions, such as fear and hate and haste and fatigue. The functions or uses of saliva are both mechanical and chemical. It acts mechanically to incorporate and mix the food in the mouth, to render swallowing easier and to keep the tongue and mouth moist, so aiding articulation. (See Digestion).

The secretion of the pancreas markedly resembles that of the salivary glands in chemical composition, and exerts an action on the food similar in many respects, and in those forms in which salivary glands may be wanting or undeveloped the pancreatic secretion may supply the place of the salivary fluid. This action is chiefly confined to a slight action upon starches, partly converting them to sugars. Hence the slight sweetness of bread when chewed. Among invertebrates salivary glands are usually well represented. Insects and other *Annulosa* and the generality of mollusks thus possess definite structures devoted to the secretion of the salivary fluid.

Calculous concretions (salivary calculi) may form in the salivary glands, and may cause obstruction of their ducts, and necessitate the performance of an operation for their removal. Saliva would appear to become abnormal and to constitute a source of infection in hydrophobia or rabies; and syphilis is said to have been transmitted through this medium. Occasionally the elements of urine have been present in saliva — forming the so-called urinary saliva of pathologists — in consequence of diseased conditions, on the removal of which the secretion became restored to its normal composition. Milky saliva, so named from the presence of milk constituents, has also been described as a condition occurring in some parturient women. See Higier, 'Vegetative Neurology' (1919).

SALIVATION, or **PTYALISM**, a superabundant secretion of saliva, sometimes occurring in disease, but usually, in medicine, either determined locally by the use of masticating irritants or by drugs which act upon the whole system, especially by mercurial preparations. In the last case it is accompanied by a coppery taste and by the swelling of the gums, which become of a pale rose color, except close to the teeth, where they are of a deeper red. The breath is "mercurial" and very fetid, and the teeth seem elongated and loosened. If the use of mercury is continued the swelling of the gums increases; it affects the tongue and all the salivary organs; finally, the mucous membrane is studded with small superficial ulcers covered with a white skin. Salivation is ordinarily anticipated, during mercurial treatment, by maintaining cutaneous perspiration by means of warm baths, friction and exercise. If salivation is persistent notwithstanding the use of these means, emollient gargles containing more or less of opium are used, and on the abatement of the salivation they are replaced by astringent tonics. Salivation was formerly frequent, but has become rare through modifications in mercurial treatment.

SALIX, one of the two genera of the family *Salicaceæ* (the other being *Populus*). The species are diœcious trees and shrubs, inhabiting principally the northern hemisphere and the temperate and arctic zones, and very abundant therein, especially along the banks of streams and ponds. The leaves are alternate and narrow and the small flowers, reduced to a disc bearing either stamens or pistil, according to sex, are gathered into unisexual catkins, each flower subtended by a bract. These catkins usually appear before the leaves, and are fertilized by insects, having nectaries for their attraction, the male flowers, moreover, showing large bright-colored anthers and a honey-like odor. The two-valved capsules contain numerous seeds, crowned by dense plumes of soft hairs, which enable them to float off on the wind and be disseminated by it. There are described nearly 300 species of *Salix*, which have been broadly classified as Sallows, Osiers and Willows.

Many fossil forms of *Salix* have been found. Salicin is a crystalline glucoside obtained from the bark of various species of *Salix*, and is one of the sources of salicylic acid, for which it is sometimes substituted in medical practice. See also Willow.

SALLEE, SALE, SALI, SLA, or SULLEE, Morocco, a seaport on the western coast of the Atlantic, 106 miles west of Fez, at the mouth of the Buregreb, formerly the great centre of Moorish piracy, immense depredations being committed from it upon European commerce. It is particularly noted for the carpets which it produces, of fine texture and bright colors. The river, which formerly admitted large vessels, is now choked up with sand. On the opposite side of the river stands Rabat (q.v.), called often New Sallee. Pop. of Sallee about 20,965.

SALLUST, săl'ŭst (Gaius Sallustius Crispus), Roman historian: b. Amiternum, in the Sabine district, 1 Oct. 86 B.C. (668 A.U.C.); d. Rome, 13 May 35 B.C. (719 A.U.C.) or 34 B.C. (720 A.U.C). He held the offices of quæstor and *tribunus plebis*, attained senatorial rank, was of the Cæsarian faction in the Civil War, went to the war in Africa as prætor in 47 B.C. and after the close of the struggle at Thapsus was made commander in Africa with title of proconsul. Having returned to Rome in 45 B.C., he formed the extensive gardens celebrated as

the Horti Sallustiani and spent the remainder of his life in retirement.

Of Sallust's historical works, two monographs have come down to us intact: *Bellum Catilinae,* which was probably published in 43 B.C.; and *Bellum Jugurthinum,* which appeared about 41 B.C. The first, an account of the conspiracy of Catiline, was not prepared from the original documents available, and its chronology and facts are distorted. It aims at the explanation of motive and general development, and is of value for its literary rather than its historical qualities. Sallust concurs in Cicero's estimate of Catiline. The second work, an account of the Jugurthine War of 111–105 B.C., shows evidence of the use of original sources as well as of the author's own experience in Africa, but it, too, is of more interest for its portraiture than its history. Sallust's partisanship of Marius is also apparent. His greatest work, the five books of the *Historiae,* a history of the republic from 78 to 67 B.C., has survived only in fragments, including four speeches and two letters. Sallust was influenced by the Greek historian Thucydides. His style, consciously archaic, is graphic and effective. The best Latin text with an English translation is John C. Rolfe's *Sallust* (New York 1931).

SALMASIUS, săl-mā′zhĭ-ŭs, **Claudius** (Lat. name of CLAUDE DE SAUMAISE), French classical scholar: b. Semur-en-Auxois, France, April 15, 1588; d. Spa, Spanish Netherlands, Sept. 3, 1653. The son of a magistrate, he studied under Isaac Casaubon in Paris and under the elder Denis Godefroy (Gothofredus) in Heidelberg, and was admitted to the bar in Dijon in 1610. He soon abandoned the practice of law to devote himself to scholarship, however, and in 1629 was prevented from succeeding to his father's post because of his Protestantism. In 1631 he accepted a professorship at the University of Leiden, and there, except for a visit to Sweden in 1650–1651 at the invitation of Queen Christina, he remained for the rest of his life. Salmasius was one of the most learned men of his times. Besides Latin and Greek, he was acquainted with Hebrew, Arabic, Persian, Coptic, and other ancient languages, and he published more than 80 works. Among the most important are an edition of Lucius Annaeus Florus (1609); Casaubon's and his own notes on the *Historia Augusta* (1620); *Plinianae exercitationes in C. Julii Solini polyhistora* (1629), a commentary on Gaius Julius Solinus' *Polyhistor; De lingua Hellenistica* (1643); *Observationes in jus Atticum et Romanum* (1645); and the posthumous *De re militari Romanorum* (1657). It is, however, for his controversy with John Milton (q.v.) that Salmasius is best known. A firm believer in the divine right of kings, he published in 1650 his *Defensio regia pro Carolo I,* in defense of Charles I of Great Britain, to which Milton replied in the celebrated *Pro populo Anglicano defensio contra Claudii anonymi, alias Salmasii defensionem regiam* (1651).

SALMERON Y ALONSO, săl-mā-rōn′ ē ä-lôn′sō, **Nicolás,** Spanish statesman and philosopher: b. Alhama de Almería, Spain, April 10, 1838; d. Pau, France, Sept. 21, 1908. He was educated at the universities of Granada and Madrid, and in 1866 succeeded to the chair of philosophy at the latter. An ardent republican, he was imprisoned for five months in 1867, and in the following year was a member of the revolutionary junta. Elected to the Cortes in 1871, he became minister of justice in 1873, and from July to September of that year served as president of the republic. Forced into exile in 1875, he was not permitted to return to Spain until 1881. Three years later he resumed his professorship, and in 1886 was re-elected to the Cortes. An excellent orator and an influential teacher, Salmerón did much to form the succeeding generation of Spanish scholars.

SALMON, săm′ŭn, **Daniel Elmer,** American veterinarian: b. Mount Olive, Morris County, N. J., July 23, 1850; d. Butte, Mont., Aug. 30, 1914. Following his graduation from Cornell University in 1872, he practiced veterinary medicine in Newark, N. J. In 1879 he became an investigator for the United States Department of Agriculture. He organized the department's veterinary division in 1883, and in the following year, when it became the Bureau of Animal Husbandry, was appointed its chief, a post he held until 1905. In this capacity he did much to ensure pure meat supplies. Among the practices he introduced were a nationwide system of meat inspection, the inspection of cattle exports, and the quarantine of imported livestock. From 1906 to 1912 he headed the new faculty of veterinary science at the University of the Republic in Montevideo, Uruguay, and in the following year became manager of a laboratory in Butte, Mont., producing serum against hog cholera. Salmon served as president of the American Public Health Association and the American Veterinary Medical Association. He did notable research in livestock diseases and published his findings in almost 100 articles.

SALMON, săl′mŭn, **Thomas William** American psychiatrist: b. Lansingburg, Rensselaer County, N. Y., Jan. 6, 1876; d. Long Island Sound, N. Y., Aug. 13, 1927. He received his M.D. degree from Albany Medical College in 1899, and four years later joined the staff of the United States Marine Hospital Service (later the United States Public Health Service). In 1905 he was assigned to Ellis Island, where he became concerned with the problem of mentally ill immigrants. While on leave from the service in 1911 as chief medical examiner for the New York State Commission in Lunacy, he devised regulations to deal with the problem in an enlightened fashion. In 1915 be became medical director of the National Committee for Mental Hygiene, which sent him to England to study the effects of combat on mental health. After the United States declared war, in 1917, he was commissioned a major in the United States Army Medical Corps. He remained in the army for two years, rising to the rank of brigadier general. For his services in preventing the induction of the mentally unfit and in controlling shell shock he received the Distinguished Service Medal. (See also PSYCHIATRY—*Psychiatry of World War I.*) In 1921 he was appointed professor of psychiatry at Columbia University. His career was cut short six years later when he was drowned while on a yachting trip. Salmon was a founder of *Mental Hygiene* and the author of numerous articles in this and other periodicals.

SALMON, săm′ŭn, city, Idaho, seat of Lemhi County, situated at the confluence of the Salmon

and Lemhi rivers, at an altitude of 4,003 feet, 160 miles northeast of Boise. It is the trading center for a mining, lumbering, and agricultural area and has creameries and sawmills. A federal fish hatchery and the headquarters of the Salmon National Forest are located here. Salmon was permanently settled in 1866 and founded as Salmon City in the following year. It assumed its present name in 1869. Government is by mayor and council. Pop. (1950) 2,648.

SALMON, river, Idaho, rising in the Salmon River Mountains in Custer County. It flows north-northeast to the city of Salmon, where it is joined by the Lemhi River, and then north, west across the state, and north again to its confluence with the Snake River in Nez Perce County, 38 miles south-southeast of Lewiston. Its total length is about 425 miles. The river abounds in salmon and has cut a number of spectacular canyons through the mountains.

SALMON, a fish of the family Salmonidae, regarded as the highest type of the true or teleostean fishes. The family includes the North American genera *Coregonus* (whitefishes), *Leucichthys* (ciscoes), *Stenodus* (the inconnu or sheefish), *Cristivomer* (the lake trout), *Salvelinus* (trouts or chars), *Oncorhynchus* (Pacific salmon), and *Salmo* (Atlantic salmon). In *The Fishes of North and Middle America* (part 1, p. 460, Washington 1896), the eminent American ichthyologist David Starr Jordan (q.v.) spoke of this group as follows:

> As now restricted, this is no longer one of the large families of fishes, but in beauty, activity, gaminess, and quality as food, and even in size of individuals, different members of the group stand easily with the first among fishes. The *Salmonidae* are confined to the northern regions, and north of about 40° N., everywhere abundant where suitable waters occur. Some of the species, especially the larger ones, are marine and anadromous, living and growing in the sea, and entering fresh waters to spawn. Still others live in running brooks, entering lakes or the sea as occasion serves, but not habitually doing so. Others again are lake fishes, approaching the shore, or entering brooks in the spawning season, at other times retiring to waters of considerable depth. Some of them are active, voracious and gamy, while others are comparatively defenseless and will not take the hook. The large size of the eggs and their lack of adhesiveness, with the ease by which the eggs may be impregnated, render the Salmon and Trout especially adapted for artificial culture. The *Salmonidae* are of comparatively recent evolution, none of them occurring as fossils, unless it be in recent deposits. The instability of the specific forms and the lack of sharply defined specific characters may be in part attributed to their recent origin, as Dr. [Albert C. L. G.] Günther has suggested.

ATLANTIC SALMON

The Atlantic salmon (*Salmo salar*) is native to the rivers of both sides of the North Atlantic Ocean. Its body is moderately elongate and only slightly compressed, the greatest depth being about one fourth the total length without the caudal fin. The length of the head is approximately equal to the depth of the body, and the mouth is of moderate size. The scales, which are comparatively large, number about 120 in the lateral line. The dorsal fin has 11 rays, and the anal fin 9 rays. The color, like the form, varies with sex, age, food, and condition. The adult is brownish above and silvery on the sides, with numerous small black spots, often X- or XX-shaped, on the head, body, and fins, and with red patches along the sides of the male. Young salmon have about 11 dusky crossbars, besides black and red spots. The average adult weighs 10 to 20 pounds, but specimens of over 80 pounds have been recorded.

North American Range.—The original natural range of the Atlantic salmon in North America stretched from Greenland to Long Island Sound. In fact, the vast abundance of salmon was one of New England's chief recommendations for settlement in colonial times. The Merrimack River is reported to have been so filled with them during the spring migration that they sometimes crowded the fish near the banks out onto land. Even in the late 18th century the Rev. Samuel Andrew Peters was able to report in his *General History of Connecticut* (London 1781) that the "shad, bass, and salmon more than half support the province." There is no good reason to suppose that salmon did not originally run in the Hudson River, although direct evidence that they did so in abundance is lacking. In his *Zoology of New-York* (part 4, p. 242, Albany, 1842), the naturalist James E. De Kay mentions that one was taken near Troy, N. Y., in August 1840. Long before then, however, the New York market had ceased to be supplied from

Dr. George B. Kelez, Fish and Wildlife Service

Salmon jumping Brooks Falls, Alaska.

the Connecticut River, receiving instead salmon from the Kennebec River, packed in ice. Few, if any, salmon entering the St. Lawrence River from the sea ever ascended as far as Lake Ontario, and the salmon inhabiting that lake and its tributaries as a rule made the lake their sea and the limit of their downward migrations.

The reason for the decline in numbers of the Atlantic salmon was everywhere the same—overfishing in the rivers and the damming of the upper streams for milling and other purposes. Although Peters had recorded in 1781 that salmon "fill the Connecticut River for many days, and no finite being can number them," by 1819 they had almost disappeared from the river. In 1952, *The Book of Fishes* (see *Bibliography*) reported that the annual catch for Maine, which in 1889 had been 152,740 pounds, was last recorded as 1,000 pounds.

Habits and Feeding.—The American ichthyologist George Brown Goode wrote at great length on the habits and feeding of salmon. In *The Fisheries and Fishery Industries of the United States* (see *Bibliography*), he remarked that most salmon are peculiarly freshwater fishes,

though several share the sea-dwelling habit, and others, like the brook trout, descend into salt water when they are not prevented from doing so by barriers of temperature. On page 470 he stated:

> I am inclined to the view that the natural habitat of the Salmon is in the fresh waters, the more so since there are so many instances . . . where it has been confined for years in lakes without apparent detriment. . . . The Salmon while it remains in the sea or in the brackish estuaries takes particular delight in feeding on crustaceans and their eggs, small shrimps, and young crabs. When in the rivers they eat but little, though they are at times eager enough for food, as testify their voracious rushes at the angler's fly-hook. The absenteeism of the Salmon is due principally to the dearth of desirable food in the rivers. The young fish stay in fresh water for one, and frequently two, years. When they pass down to the sea they weigh but a few ounces. They find congenial food and begin to grow rapidly. The broad world of ocean affords them new opportunities for adventure and self-advancement, and it is only when summoned by the duties of family life that they return within the narrow limits of the old home. When Salmon live in the lakes they prey upon minnows and other small fishes, but those of the sea delight also in small crustaceans and their eggs, to which they owe the vivid color of their flesh. The habits of successive generations become hereditary traits. . . .

It is as an adult, four years of age or a little older, that the salmon enter the rivers and work their way upstream. They have been two years or more in the sea, where and how living are little known. Young salmon that have stayed only two years in the sea remain small: size increases with the length of time passed in the sea. Probably salmon do not go very far from the mouth of the river in which they were born. They enter rivers as soon in the spring as the water has reached a moderate degree of warmth, and they therefore appear in southern rivers much earlier than in northern ones. They are in magnificent condition and make their way upstream with extraordinary persistence and force, overcoming swift rapids, climbing cataracts, and leaping unbroken falls as high as 12 feet (only the strongest can accomplish so great a feat, and sometimes only after repeated efforts). It is during this early advance that the angler seeks the streams where the salmon are running (see ANGLING).

Having reached, as near as time and circumstances permit, the sources of the stream, the females deposit their eggs in vast quantities. The males simultaneously void their milt, so that impregnation takes place at once. The Atlantic salmon does not die after spawning, and may return to the sea.

Growth and Development.—Spawning takes place in North American rivers late in the fall. The development of the embryo is soon checked by the winter cold, so that it does not burst the shell of the egg until early spring. At this time, the embryo salmon has a slender, half-transparent trunk, less than 1 inch in length, carrying an immense ovoid sac—the yolk sac—suspended beneath. For about six weeks after hatching it hides in crevices among stones, incessantly fanning its pectoral fins. During this period it takes no food, but is supported and nourished by the yolk sac, whose substance is gradually absorbed into the rest of the body. Not until the sac has nearly disappeared does the salmon really look like a fish and begin to seize and swallow food. It now puts on a mottled coat with several heavy, dark bars across its sides and with bright red spots, larger and fewer than those of a trout. It therefore looks very unlike the adult salmon but much like a young trout. In this stage it is termed, in Scotland and England, a parr, and was formerly thought to be a wholly different species from the salmon.

The parr stage lasts a year or two in British rivers, and the few observations that have been made in the United States and Canada indicate that its duration is more likely to be two years than one in North American rivers. The parr, which at first is little over an inch long, is provided with good teeth and a good appetite. Beginning to feed at a season of the year when the water is almost crowded with small insects and other more minute creatures, it grows rapidly, probably increasing its weight 30 or 40 times during its first summer. In two years it reaches a length of 6 or 8 inches, and its bright red spots and dark bars have been replaced by a silvery coat like that of the adult salmon. It is now termed a smolt and is ready to go to sea, which it does with little delay, passing beyond the range of man's observation to a region where it finds a rich feeding ground and rapidly increases in size.

In northern American rivers, those of New Brunswick and farther north, as in those of northern Europe, the salmon returns from the sea when it has attained a weight of 2 to 6 pounds, and is then termed a grilse. In Canadian rivers in general, grilse occur in great numbers, coming in from the sea at a later date than the adults, but like them ascending to the upper waters and mingling freely with them. Grilse are seldom seen in the rivers of the United States, yet it by no means follows that the salmon in these streams do not pass through the same phases of growth as those of Canada and northern Europe, or that the growth is more rapid. It is merely that in the grilse stage the salmon of the United States generally lack the instinct, or perhaps have not undergone some glandular change, that impels their more northern relatives to seek fresh water.

Grilse exhibit to a great degree the characteristics of the adult salmon. The main external differences are a shorter head, a slenderer form, and a difference in color and markings. They are remarkably active and agile, leaping to great heights. The male is sexually well developed and mates with the adult salmon, but the female is immature. Like the adult, grilse abstain from food, and consequently lose weight, during their stay in fresh water.

PACIFIC SALMON

There are five species of salmon on the Pacific coast of North America, all belonging to the genus *Oncorhynchus:* the quinnat, Chinook, or king salmon (*O. tschawytscha*); the red, sockeye, or blueback (*O. nerka*); the humpback or pink (*O. gorbuscha*); the silver or coho (*O. kisutch*); and the dog or chum (*O. keta*). The features which distinguish the Pacific from the Atlantic salmon are not marked, and consist chiefly in a larger number of rays in the anal fin and of branchiostegals, gill rakers, and pyloric caeca.

These five salmons form the most important group of fishes entering the rivers of North America. In value of total catch, the red is the most important, followed by the humpback, Chinook, dog, and silver. The aggregate catch in pounds of Pacific salmon in the Pacific coast states and Alaska was as follows in the period 1949–1953:

Year	Pacific coast states	Alaska
1949	95,859,000	388,345,000
1950	63,725,000	264,919,000
1951	97,635,000	276,588,000
1952	69,307,000	282,967,000
1953	92,658,000	220,276,000

The steelhead (*Salmo gairdneri*), technically a trout but popularly regarded as a salmon, also inhabits the waters of the Pacific coast and adds to the importance of the salmon tribe.

Quinnat, Chinook, or King Salmon.—The characteristics of the quinnat salmon are as follows: scales in longitudinal series, from 135 to 155, with an average of about 145; pyloric caeca, 140 to 185; gill rakers, comparatively short and usually 23 in number, 9 being above the angle; rays in anal fin, 16; branchiostegals, 15 to 19. The body is robust; the head, conic; the eye, small; the caudal fin, deeply forked. The color above is dusky, sometimes with a bluish or greenish tinge; the sides and belly are silvery; and the head is dark with a metallic luster. The back and the dorsal and caudal fins have numerous round black spots.

The quinnat is known in various parts of its range as the Chinook, king, Columbia River, Sacramento, or tyee salmon. It is the finest of the Pacific salmons. Not only is it superior in food qualities, but it attains a much larger size and has a wider geographical range and a greater value per pound. When fresh from the ocean, it is a very handsome, well-formed fish, greatly resembling the Atlantic salmon, though less symmetrical and graceful. It is of a uniform rich red color, which becomes paler or streaked at the approach of the spawning season. Its value for canning purposes is enhanced by the persistence of the red color of the meat after cooking. No other salmon in the world compares with it in size. In the Yukon River in Alaska it reaches a weight of over 100 pounds. Farther south it runs smaller, although in the Sacramento River specimens weighing 50 or 60 pounds are not rare; 22 pounds is a fair average weight in the Columbia River, and 16 pounds in the Sacramento. Its known range is practically from Monterey Bay in central California to the Yukon, but it probably ranges farther north.

While in the sea, quinnat salmon probably do not wander very far from the mouths of the rivers they have left, and for this reason usually return to spawn in the rivers in which they were hatched. They prefer the larger rivers, like the Sacramento, the Columbia, the Nushagak, and the Yukon. They are very persistent in ascending the rivers to spawn, and have been seen crowding up the rivulets which form the headwaters of the Sacramento until nearly half of their bodies were exposed to the air. No matter how far the headwaters of a river are from the ocean, some of the salmon will press forward until they are stopped by impassable obstructions or by water too shallow for them to swim in. On reaching the headwaters, they remain for a week or two before proceeding to the spawning grounds. Their rate of progress varies with the season and probably depends to a great extent on the rainfall and the state of the river; rain, roily water, or high water always hastens their progress.

When the quinnat first come from the ocean, the sexes are almost identical in appearance, but as the time for spawning approaches, a difference is noticed between them, and during the spawning season it becomes more marked. The fully developed ova of the female give her a round, plump appearance, while the male grows very thin. His head flattens, the upper jaw curves like a hook over the lower, and the eyes become sunken. Large, powerful, white, doglike teeth appear on both jaws, and the fish acquires a gaunt and savage appearance. As soon as quinnat reach fresh water, their appetites grow less, and their throats begin to narrow, and their stomachs to shrink. This process does not at first entirely prevent them from feeding, but it changes them enough to enable them to overcome the temptation to return to their well-stocked feeding grounds in the ocean. Moreover, the longer they remain in fresh water, the greater the changes, and the desire to turn back for food is correspondingly lessened. This alteration comes about gradually, increasing day by day from the time they leave tidewater until at the near approach of the spawning season their throats and stomachs become entirely incapable of receiving food, and the desire to feed leaves them entirely. The great reserve of flesh and blood which they bring with them from the ocean enables them to keep the vital organs active until their mission up the freshwater streams is accomplished.

The spawning season of the quinnat varies in different rivers and, considering the entire Pacific coast, lasts at least six months. In July the summer run spawns at the headwaters of the McCloud and Sacramento rivers in California; in August and September, farther down these rivers. In October the fall run begins in the McCloud and below, and this run continues spawning through November into December. In the Columbia River spawning begins at the headwaters in June; at Clackamas, Ore., 125 miles from the mouth of the Columbia, it begins about the middle of September and continues until November.

A few days before they are ready to spawn, the salmon hollow out elongated cavities with their heads and tails in the gravel beds of the river where there is some current, and here in due time the eggs and milt are deposited. The eggs drift into the crevices in the pile of stones thrown up below the hollow, sink to the bottom, and remain in that protected position during incubation; here, also, the young remain until the umbilical sac is absorbed. The eggs and young are liable to destruction by freshets, but are comparatively safe from other injurious influences. The quinnat is not so prolific as the Atlantic salmon, 300 or 400 eggs to each pound of the weight of the parent fish being a fair average.

Quinnat salmon, like all the Pacific salmon, do not return to the sea, but die on or near their spawning grounds. After spawning they rapidly deteriorate, the flesh shades off to a light, dirty pink, and they become diseased and emaciated. Their scales are wholly absorbed in the skin, which is of a dark olive or black color, and blotches of fungus appear on their heads and bodies. In places there are long white patches where the skin has partially worn off. Their fins and tails become badly mutilated, and in a short time they die exhausted.

As the salmon ascend the rivers, they are caught by gill nets, fyke nets, pounds, weirs, seines, wheels, and other devices. In the Sacramento and Columbia the greater number are caught as they head upstream by means of gill nets drifting with the current or tide. In the rivers they are comparatively safe from natural enemies except otters, ospreys, and fishers, but immense numbers are destroyed at the mouths of the streams by seals and sea lions.

The quinnat has been introduced into Japan, Australia, New Zealand, and Europe, but efforts to acclimatize it on the Atlantic coast of the United States have been unsuccessful.

Red, Sockeye, or Blueback Salmon.—The characteristics of the red salmon are as follows: scales in longitudinal series, about 130; pyloric caeca, 75 to 95; gill rakers, comparatively long and 32 to 40 in number; rays in anal fin, 14 to 16; branchiostegals, 13 to 15. The body is rather slender; the caudal fin, much forked; the anal and the dorsal fins, low. The color above is bright blue, and the sides are silvery. There are no spots.

If we consider the entire west coast, the red salmon is probably more numerous than all the others combined. It is known in different regions as the blueback, redfish, Fraser River salmon, and sockeye or sauqui. Since 1914, when the route to its spawning grounds was temporarily blocked, it has not returned in abundance to the Fraser River.

HUMPBACK SALMON

ATLANTIC SALMON

RED SALMON

SILVER SALMON

For canning purposes the red salmon is only slightly inferior to the quinnat, for the color of its flesh is a rich red that persists after canning. Large quantities are canned in Alaska, particularly on Kodiak Island, and its commercial importance to the territory is indicated by the fact that about half the value of Alaskan canned salmon consists of fish of this species. Comparatively few red salmon are sold fresh in the United States.

This is next to the smallest of the salmons. The maximum weight is about 15 pounds, but the fish rarely weighs over 8 pounds, and the average weight is scarcely 5 pounds. In various lakes, where it weighs only half a pound when mature, it is called the little redfish. The red salmon ranges from Humboldt Bay, Calif., to the far north, but in general it ascends only those rivers which rise in cold, snow-fed lakes. Except in the breeding season, its color is a clear, bright blue above, with silvery sides and belly. At the spawning period the back and sides become red, and the male develops an extravagantly hooked upper jaw. This fish is also found landlocked. In lakes it is generally called silver trout; in streams, redfish.

Humpback or Pink Salmon.—The characteristics of the humpback salmon are as follows: scales, very small, 210 to 240 in longitudinal series; pyloric caeca, very slender, about 180 in number; gill rakers, short, about 28 in number, 13 being above the angle; anal rays, 15; branchiostegals, 11 or 12. The color is bluish above and silvery on the sides. The hind part of the back, the adipose fin, and the tail have numerous black spots; the largest spots, of oblong shape, are on the tail.

The humpback is the smallest Pacific salmon. Its weight averages only 5 pounds, and rarely reaches 10 pounds. Its range is from Alaska, where it is abundant, to California, and it also runs off Japan. In food qualities the fresh-run humpback is scarcely inferior to any other salmon. While the flesh has a very fine flavor, it is paler than that of other red salmon, and the species was formerly neglected by canners. By the 1950's, however, it was first in quantity and second only to the red salmon in total value among the varieties of canned salmon of the Pacific states and Alaska.

The humpback salmon generally seeks the smaller streams for the purpose of spawning and deposits its eggs a short distance from the sea, sometimes within only a few rods of the ocean. At Kodiak Island, Alaska, where it is often very abundant, it arrives in the latter part of July, the run continuing for only a few weeks. Spawning takes place in August.

Silver or Coho Salmon.—The characteristics of the silver salmon are as follows: scales, large, from 125 to 135 in longitudinal series; pyloric caeca, comparatively few and large, 45 to 80 in number; gill rakers, long and slender, 23 in number, 13 being below the angle; anal rays, 13 or 14; branchiostegals, 13 or 14. The body is long; the head, short and conic; the snout, blunt; the eye, small; the fins, small, the caudal fin being deeply forked. The color above is bluish green, and the sides are silvery and finely punctulated. Spots are few and obscure on the head, back dorsal fin, adipose dorsal fin, and the upper rays of the caudal fin.

The silver salmon is also known as the silversides, skowitz, kisutch, hoopid salmon, and coho salmon. It is a beautiful fish, with a graceful form and a bright silvery skin. Its flesh, which is fairly good, usually has a bright red color, but this fades on cooking. Canned in large quantities, it is also well adapted for quick freezing for the market. Its average weight in the Columbia River and Puget Sound is 8 pounds, but in Alaska it is nearly 15 pounds. Its range is from San Francisco to northern Alaska, and as far south on the Asiatic coast as Japan. It runs up the rivers to spawn in the autumn or early winter, when the waters are high, but usually does not ascend great distances from the ocean.

Dog or Chum Salmon.—The characteristics of the dog salmon are as follows: scales, of medium size, 138 to 155 in lateral line; pyloric caeca, 140 to 185; gill rakers, short and few, 9 being above and 15 below the angle; anal rays, 13 or 14; bran-

chiostegals, 13 or 14. It has the form of the quinnat, but its head is longer and more depressed. The color is dusky above and on the head, and paler on the sides. There are sometimes very fine spots on the back and sides. The tail is either a plain dusky color or finely spotted, with a black edge, and the other fins are blackish.

The dog salmon is dried in large quantities by the Alaskan natives. Its average weight is 12 pounds, and the maximum about 20 pounds. It is found from San Francisco to Kamchatka, being especially abundant in Alaska, and also occurs off Japan. The enlargement and distortion of the jaws give the species a very repulsive look, and its large teeth give it its common name. When it has just arrived from the ocean, its flesh has a beautiful red color and is not unpalatable, but it deteriorates rapidly in fresh water. The dog salmon spawns in shallow rivers and creeks. Larger quantities are utilized in Puget Sound than elsewhere in the Pacific states.

Steelhead.—In form, size, and general appearance, the steelhead resembles the salmon of the Atlantic coast, and is distinguished from other Pacific coast salmon by its square tail, small head, round snout, comparatively slender form, light-colored flesh, and habit of spawning in the spring. It is slenderer than the quinnat and consequently not so heavy for its length. Its average weight in the Columbia is about 8 pounds, although it sometimes reaches 30 pounds.

This fish, popularly regarded as a salmon, is now generally accepted as the silvery, sea-run form of the rainbow trout (*Salmo gairdneri*). It is found from San Diego north to Alaska and, in its rainbow phase, in eastern and central North America. Its color varies considerably with the locality.

The steelhead begins to enter the Columbia in the fall, and is then in prime condition. Like the quinnat, it ascends rivers for long distances, and has been found almost as far up the tributaries of the Columbia as the ascent of fish is possible. Since the greatest quantities of steelheads are caught in the spring, when the fish are spawning and are in a deteriorated condition, they are not generally esteemed as food, but when they come fresh from the sea and are in good condition, their flesh is excellent. As the demand for salmon has increased, steelheads have been utilized for canning, and they form a noteworthy part of the canned salmon from the Columbia River. In Washington, where they are regarded by law as a sport fish, their capture or processing for sale is prohibited, but they may be taken for commercial purposes in Oregon.

ARTIFICIAL PROPAGATION

The first steps in an effort to restock with salmon the rivers of the eastern coast of the United States were undertaken by Massachusetts and New Hampshire about 1865. At first eggs were obtained from Canada, but this source was cut off, and the authorities were compelled to attempt to get eggs by capturing salmon in the spring at the mouth of the Penobscot River in Maine, and keeping them alive and well until they spawned in November. After some experimentation a few live salmon were safely caught and carried in floating cars to Craig Brook, near the mouth of the Penobscot, where ponds and hatcheries fed by a clear stream had been prepared for them. The fish throve; year by year quantities of eggs were obtained and shipped to other places to be hatched. In 1889 the Craig Brook station was acquired by the federal government and enlarged into a regular establishment for the rearing of fry, on an extensive scale, to the age of six or seven months. Later other establishments were opened for the rearing and distribution of landlocked salmon. Still more extensive operations in salmon culture were undertaken on the Pacific coast to replenish the rivers of California and the Columbia Basin, millions of fry (principally quinnat) annually being artificially hatched, reared, and placed in the headwaters of the various rivers.

See also ALASKA—*Natural Resources and Economy* (Fisheries); CANADA—*5. Fisheries* (Nature of the Industry); FISH CULTURE or PISCICULTURE; FISHERIES.

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SALMON RIVER MOUNTAINS, mountain range, Idaho, situated principally in Valley, Custer, and Lemhi counties, north of the Sawtooth Mountains. The highest peaks are Twin Peaks (10,328 feet) and Bald Mountain (10,314 feet). The Salmon River, which rises in the range, has carved a number of canyons through it. The mountains are thickly wooded, and the range includes parts of the Salmon and Challis national forests.

SALMONBERRY, a raspberry (*Rubus spectabilis*) native to the Pacific coast from Alaska south to California and east to Idaho. It is cultivated both for its edible, salmon-colored berries and for its reddish flowers. The name is also applied to *R. parviflorus,* a western species of raspberry with white flowers and inedible fruit; and, improperly, to the cloudberry.

SALMONEUS, săl-mō′nūs or săl-mō′nē-ŭs, in Greek mythology, one of the six sons of Aeolus, the wind god. He became king of Elis in the Peloponnesus. Possibly as a rite to produce rain, he dragged bronze kettles after his chariot to imitate thunder and threw torches to imitate lightning, meanwhile crying out that he was Zeus himself. For this impiety he was immediately killed by a real thunderbolt.

SALMONIDAE, săl-mŏn′ĭ-dē, a family of highly organized freshwater and anadromous fishes of the northern parts of the world. It includes the salmons, trouts, whitefishes, ciscoes, and sheefishes.

SALOL. See SALICYLIC ACID AND RELATED COMPOUNDS.

SALOME, sȧ-lō′mē, a Hebrew feminine name common in Palestine in the time of Christ. Its most notable bearer (14 A.D.?–before 62 A.D.) was the granddaughter of Herod the Great and daughter of Herodias and Herod Philip. Though not mentioned by name, she is the damsel in Matthew 14:3-11 and Mark 6:17-28 who is instigated by Herodias to ask of Herod Antipas the execu-

tion of Saint John Baptist. Josephus says she first married Philip the tetrarch, son of Herod the Great and Cleopatra, and afterward Aristobulus, son of Herod, King of Chalcis, her cousin-german, by whom she had several children. The name was also borne by Zebedee the mother of James the Elder and John the Evangelist, one of those women of Galilee who attended Jesus in his journeys and ministered to him. (Matthew 27:56). She asked of Christ for her sons a special place of honor in his kingdom (Matthew 20:21); and was a witness of the Crucifixion (Mark 15:20). Some infer, from comparing Matthew and John 19:25, that she was a sister of Mary the mother of Jesus.

SALOMON, Haym. American Jewish financier: b. Lissa, Poland, 1740; d. Philadelphia, Pa., Jan. 6, 1785. But meagre details are preserved of his early career, but his record as an American patriot and his services in aid of the government in Revolutionary days are well known. He was called "the good Samaritan" by S. H. Gay in his life of James Madison, and is referred to by Madison as rejecting all recompense for the pecuniary help bestowed. He was a prisoner in New York in 1775, and in 1778 escaped to Philadelphia. There acquiring wealth as a banker, he freely loaned to Robert Morris over $350,000. He negotiated all the war subsidies from France and Holland and when Continental money was withdrawn, causing suffering among the poor of Philadelphia, he distributed $2,000 in specie to relieve distress. The large indebtedness of the government to Haym Salomon was never repaid to him nor to his heirs and has been the subject of some discussion. It was favorably reported to the United States Senate in 1850. Although the amount of public securities and Revolutionary papers filed in the register's office, Philadelphia, Feb. 15, 1785 reached $353,744, the inroads of the British army in 1814 destroyed every record in relation to the vouchers. On Feb. 24, 1893 a bill was presented to the House that a gold medal be struck off in recognition of Haym Salomon's services, his heirs to waive all claims for indemnity; but the measure, although reported favorably, was too late for consideration.

SALOMONS, Sir David Lionel Goldsmith-Stern, English electrical engineer: b. June 28, 1851. He was mayor of Tunbridge Wells in 1895, and was vice president of the Institution of Electrical Engineers. He published *Electric Light Installations; Photographic Formulae;* and various monographs on electrical topics.

SALON, sä-lôn', **The Paris,** (1) the large gallery in the Louvre, in Paris, in which art exhibitions were formerly held; (2) a name given the annual art exhibition in Paris; (3) the leading galleries where modern artists exhibit their works; (4) an apartment for the reception of company; in the plural, fashionable assemblages, or circles of fashionable society. See Paris.

SALON (-de-Provence), town in the department of Bouches-du-Rhone, in southeast France, about 40 miles northwest of Marseilles. A center of manufacture and trade in olive oil and soap. It has churches dating back to the 12th and 14th centuries, and remains of Roman walls. Pop. (1936) 9,047.

SALONA. See Solin.

SALONIKA, sä-lô-nē'kà, since 1937 officially **THESSALONIKE,** thĕs-à-lô-nyē'kyē, ancient Therma, which later became Thessalonica, seaport in the Greek Department of Macedonia. Transferred to Greece in 1913, at the close of the Balkan Wars (q.v.). Until then Salonika had been the capital of a Turkish vilayet of the same name. Situated on the Gulf of Salonika, in the Aegean Sea, 315 miles southwest of Constantinople, the town occupies a fortified slope, and, surrounded by stately cypresses and lofty white walls, ascends from the shore in triangular form. Its architecture is characteristically Oriental, the early Christian churches having been converted into mosques. Chief of these is Saint Sophia, similar to the celebrated mosque of that name in Constantinople, on a smaller scale, but beautiful; the church or mosque of Saint George (with walls 20 feet thick), which contains early Christian mosaics dating from 400 A.D.; Saint Demetrius, destroyed by fire in 1917, had a fine interior; and various others, besides Greek churches and Jewish synagogues. The numerous antiquities include the Citadel, or ancient Acropolis, with its seven towers, called by the Turks *Yedi-Kuleh,* containing a triumphal arch which dates from the time of Marcus Aurelius; the Propylæum of the Hippodrome, a splendid Corinthian colonnade of five pillars; the triumphal arch of Augustus, commemorating the battle of Philippi; the arch of Constantine, etc. There are large bazaars, and aqueducts bring water from the distant hills to the city. Salonika, however, was also characterized by much squalor and miserable quarters, though considerable improvements have been introduced under Greek rule. Since the construction of various railway systems and harbor improvements, the trade, already considerable, has increased. The exports consist of corn, cotton, wool, tobacco, silk cocoons, opium, wine, brandy, skins, antimony and timber; the imports, of sugar, flour, coffee, coal, iron and hardware, petroleum, salt, rice, glass, etc. Great Britain had the largest volume of trade before the war; next in importance were Italy, France, Austria-Hungary and Turkey. Salonika (formerly Therma) is mentioned in historical annals, in connection with Xerxes' march through Greece. It was refounded by Cassander in 315 B.C. Saint Paul preached here and addressed two of his epistles to the converts of this place (Thessalonians). During the Roman-Macedonian wars it figured as the chief station of the Macedonian fleet. After the civil wars it became the first city in Greece. It was a seat of the Christian Church at a very early period. During the barbarian invasions, it was the most important stronghold and place of defense of the Eastern empire. In mediaeval times it was taken (904) by the Saracens; (1185) by the Sicilian Normans; (1430) by the Turks. The area is 3,358 square miles; the population (1938) 539,697.

During the first Balkan war Salonika surrendered to the Greeks with a Turkish army of 29,000 under Hassan Tahsin Pasha on Nov. 8, 1912. In the course of the European War Salonika was the scene of violent international complications owing to the failure of Greece to come to the assistance of Serbia against

Bulgaria, as stipulated by treaty. On Aug. 18, 1917, a great fire broke out in the town and burnt for two days. Quite two-thirds of Salonika proper was destroyed and 100,000 persons rendered homeless. All the banks, business premises, hotels and most of the theaters were reduced to ashes. Only the bare walls of the old Byzantine Church of Saint Demetrius remained standing. By arrangement with Greece in 1923 Yugoslavia has a free zone in the harbor of Salonika. A project for reclaiming the marshlands was begun in 1935. The city was taken by the Germans in World War II, but in Oct. 1944 was retaken by the Greeks. See also GREECE; VENIZELOS, E.; WAR, EUROPEAN; WORLD WAR II.

SALONIKA, Gulf of, or THERMAIC GULF (ancient THERMAICUS SINUS), is the extreme northwestern arm of the Aegean Sea, between the peninsula of Chalcidice and the coast of Thessaly. Its length is about 85 miles; breadth, 50 miles.

SALPA, săl'pà, a genus of free-swimming ascidian of the order Thaliacea, and the family Salpidae. They are met with as single or solitary organisms and as aggregate or compound collections, the so called "salpa chains," but these are states of the same species. The solitary salpa produces by budding from a process termed the stolon, a long chain of aggregated embryos, which become the salpa chain. The individuals of this compound chain have the power of producing, by means of eggs, new solitary salpae. This is one of the instances brought forward by Johann J. S. Steenstrup in illustration of his views of the alternation of generations. The entire life-history, however, is not so much one of an alternation of generations as of a process of budding (asexual), alternating with reproduction by means of eggs (sexual). Thus, the first salp produces aggregate salps which are unlike itself, but the aggregated salps produce solitary salps unlike their parents, but resembling their grandparents. Each salpa is of oval or quadrate form, with an aperture at either extremity. Locomotion is effected by the expulsion of water from the posterior aperture, and the salpa chains thus swim over the surface of the ocean. The principal organs of the body are compacted to form the so-called "nucleus." The salpae are beautifully transparent and colorless and often phosphorescent. They abound in the waters of the Gulf Stream and in the Mediterranean.

SALSIFY, săl'sĭ-fĭ, a biennial composite (*Tragopogon porrifolius*), sometimes attaining four feet in height. The genus is popularly known as Goat's Beard, because of the long silky beard or pappus of the seeds. It grows wild in the south of Europe, but is cultivated as a vegetable. It has narrow grass-like leaves and solitary showy purple heads of ligulate florets, the involucre consisting of lanceolate leaflets much longer than the florets. The flowers close before noon. The fruits are plumed and float through the air like those of a dandelion. Salsify is hardy and has a very long tapering tap-root, white and fleshy, and with a flavor resembling oysters, whence it is sometimes called vegetable oyster or oyster plant. Black salsify (*Scorzonera hispanica*) comes from Spain and is closely allied to the true salsify. It has a root like that of *Tragopogon,* except that it has a blackish skin. The leaves are undulate and the flowers yellow. The plant was once used for snake-bites.

SALSILLA, săl-sĭl'à, the common name of several species of the amaryllidaceous genus *Bomarea,* which produce edible tubers. Some are cultivated in greenhouses for their large gorgeously spotted flowers, borne in cymes on twining stems, and *B. edulis* is cultivated in the West Indies as a vegetable.

SALSOLA, săl'sô-là, a genus of the Chenopodiaceae family, with about 50 widely distributed species growing in saline soils, or on seashores, popularly known as saltwort. The small, axillary flowers are apetalous, but have a five-parted calyx, which in fruit encloses the utricle, and has a broad, horizontal, membranous wing. A maritime species (*S. kali*), the prickly saltwort, is a familiar spiny annual, its decumbent branches spreading from the central tap-root so as to form large rosettes on the sand. The closely-set rigid leaves radiate in all directions; they are small, awl-shaped and succulent, the mid-vein ending in a strong prickle. It is a widely diffused species and like some other plants of the same family, was formerly collected and burned for the impure carbonate of soda found in its tissues. Lumps of the fused ash were an important article of commerce, called barilla (q.v.), and yielded about 50 per cent of soda, being the original source of that chemical.

SALT, sôlt, **Henry Stephens,** English biographer: b. Nynee Tal, India, 1851; d. Brighton, April 19, 1939. He was educated at Cambridge and subsequently engaged in literary work and social reform. He was honorary secretary of the Humanitarian League from its founding in 1891 and editor of *The Humanitarian* and *The Humane Review.* He published *Life of James Thomson; Life of Henry D. Thoreau; Richard Jefferies: His Life and His Ideals; Percy Bysshe Shelley: Poet and Pioneer; Tennyson as a Thinker; Animals' Rights; The Logic of Vegetarianism; Company I Have Kept;* and edited *Songs of Freedom; Kith and Kin* (poems of animal life), and works by Godwin, Thoreau, Melville, etc.

SALT, SIR **Titus,** English manufacturer: b. Morley, Yorkshire, Sept. 20, 1803; d. Bradford, Dec. 29, 1876. He was the first to introduce the manufacture of cloth from the wool of the alpaca into England (1836). The model village of Saltaire (q.v.), three miles from Bradford, on the river Aire, was built in 1853 for the workmen engaged in his factories. He was a member of Parliament in 1859, and in 1869 was made a baronet.

SALT, a term which to the chemist means a certain kind or type of chemical compound, and to the general public a single substance, often referred to as common salt and known in chemistry as sodium chloride. The two meanings will be discussed separately.

The old and still very common definition of a salt as a chemical compound is "the product of the action of an acid on a base." If a solution of sodium hydroxide, NaOH, is mixed with a solution of hydrogen chloride, or hydrochloric acid, HCl, and the water is removed by evaporation, the single substance which remains is sodium

chloride, NaCl, a salt. In the more modern understanding of the reaction by which salts are formed, the sodium hydroxide in water solution is broken up into sodium ions, each of which has a positive charge and hydroxyl ions, each bearing a negative charge. Water is very slightly ionized and hydrogen ions in hydrochloric acid come from the hydrogen of hydrogen chloride, the negative ions being atoms of chlorine, each of which carry an extra electron, or the chloride ion. When the two solutions are mixed the hydrogen ion, which is now thought of as a proton, H^+ attached to a molecule of water, or H_3O^+, reacts with the hydroxyl ion, OH^-, to form another molecule of water. What is left in solution is an equal number of sodium ions, Na^+ and chlorine ions, Cl^-. If the water, which separates these ions and insulates them from each other, is removed by evaporation, a salt, NaCl, is left as a solid.

With very few exceptions salts are completely ionized in water solution, but the full electrical effects are not evident except in quite dilute solutions because of the interference of oppositely charged ions with such operations as carrying an electric current, lowering freezing points, and elevating boiling points. In the first case, the amount of current carried is less than theoretical, assuming each ion to be responsible for carrying or giving up one or more electrons according to the individual charge. In the second and third cases, the effect on freezing point and boiling point is much less than if the salt did not ionize at all but somewhat less than if the ions were free to exert their full effects as do molecules of glycerin or sugar in solution.

The modern definition of a salt is then a substance made up of some positive ion other than hydrogen and of some negative ion other than hydroxyl. The positive ion may be a metal such as sodium or calcium or it may be made up of a group of elements such as the ammonium ion NH_4^+ or a group of elements containing carbon as well as nitrogen and hydrogen. The negative ion may be a simple element such as chlorine or bromine, or it may be a group such as the sulphate ion, $SO_4^=$, or nitrate ion, NO_3^-. An acid salt is one which still contains some of the hydrogen of the acid, such as $NaHSO_4$, and an "oxy" or "hydroxy" salt (a better term than basic salt) contains either an oxygen atom or one or more hydroxyl groups. Thus BiOCl is bismuth oxychloride and $Bi(OH)_2Cl$ is a hydroxy salt from which the oxy salt can be derived by loss of a molecule of water. There are also double and complex salts, in which two or more simple salts crystallize together in definite proportions.

If both the acid and the base from which the salt is derived are extensively ionized, the salt in water will be neutral in reaction, that is the hydrogen ion concentration of the solution will be about that of water. If one or the other is slightly ionized, the salt in water solution will show an acid reaction or a basic reaction depending on whether the un-ionized base or acid is produced by the action of water.

Turning now to the substance with which everyone is familiar, sodium chloride, or common salt, this is a widely occurring and most useful substance. The element chlorine is found in the earth's crust only to the extent of about 0.2 per cent, while sodium represents 2.6 per cent. This would mean about twenty atoms of sodium to one of chlorine, the remaining sodium being tied up in other minerals, mostly as insoluble silicates in rocks. Yet nearly all useful sodium compounds are made from sodium chloride. This is not only because of its wide distribution and availability, but because sodium chloride is soluble in water while the complex silicates holding sodium as a constituent are not. The oceans of the world contain the larger part of the sodium chloride in the earth's crust. Sea water contains about 2.8 per cent by weight of sodium chloride, the total content of dissolved substances being less than 3.7 per cent. Some inland seas, in which there has been extensive concentration by evaporation and building up of dissolved solids by streams containing substances dissolved from minerals, contain much larger amounts of salts. The Great Salt Lake in the United States is a 15 per cent solution of salts, of which about four fifths is sodium chloride. The Dead Sea is nearly double that concentration of dissolved material, but sodium chloride constitutes only about two fifths of the total solids of that body of water.

There are deposits of solid salt all over the world, some of them several thousand feet in thickness. Along the Gulf coast of the United States, water bringing salt from great depths has deposited the salt, and as the solid crystallized it pushed up the overlying rocks into the familiar ones which are associated with salt, gypsum, petroleum, and sulphur. Underground streams flowing through salt deposits are often tapped by wells from which brine of high concentration is drawn.

The common chemical and physical properties of sodium chloride follow. This salt is remarkably stable even at high temperatures. It melts without decomposition at 800°C. and becomes a vapor at 1440°C. Dry salt reacts with concentrated sulphuric acid because hydrogen chloride is a gas and is removed as rapidly as it forms. An electric current passed through molten salt produces metallic sodium and gaseous chlorine. When such a current is passed through a concentrated solution of sodium chloride, the products are chlorine and hydrogen as gases, sodium and hydroxyl ions being left behind. This reaction will be referred to again under industrial uses of salt. Sodium chloride crystallizes in the form of cubes, and also the arrangement of atoms in the crystal is the simple cubical structure, with alternating sodium and chlorine atoms at the corners of each cubical cell of which the crystal is composed. The sodium has passed over its single valence electron to the chlorine and each atom is charged just as it is in solution. As salt is used in the household and commercially, its crystals are small cubes, and larger crystals are usually cloudy, but salt can be grown by very slow cooling into large and perfectly transparent cubes for optical instruments. Since there is a tendency for the crystal to take up a small amount of water from damp air, such instruments must be used in air-conditioned rooms in which humidity is relatively low. The solubility of salt in water does not change materially with temperature. At the freezing point of water, 100 grams of water will hold 35.6 grams of salt in solution, and at the boiling point of water, only 39.1 grams will be in solution in 100 grams of water. This property is useful in the crystallization and recovery of salt industrially.

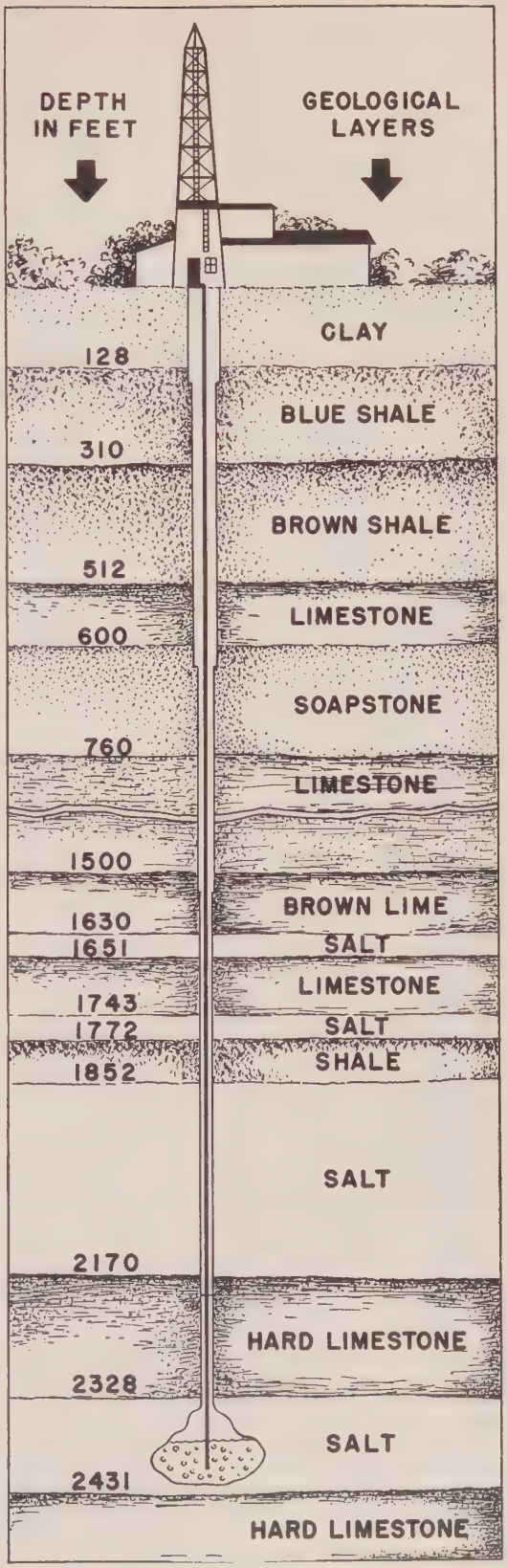
Because of its wide distribution salt has been used by man as far back as there are historical

records. In sections where salt was scarce, its commercial value was very high. The common word "salary" is derived from the Latin word *salarium,* or money allowed to soldiers for the purchase of salt. Much of the salt in general use in ancient times must have been quite impure, containing insoluble earthy material. This would account for the Biblical phrase in which salt is referred to as having "lost its savour" and thus fit only "to be trod underfoot" (Matt. 5:13). Such crude salt exposed to water would readily lose its true salt content with only clay or marl left behind.

While any extended discussion of the physiological effects of salt is beyond a review of this type, it is certainly true that common salt is an essential part of the diet of man, and particularly of herbivorous animals. Considerably more salt is demanded in modern foods than is utilized, the remainder being excreted. Gastric juice in man contains about 0.6 per cent hydrochloric acid, the source of the chloride being sodium chloride. When perspiration is excessive, as in the case of steelworkers, salt tablets are provided in modern plants, so that the loss of sodium chloride through the skin may be made up and resulting weakness may be avoided. A physiological saline solution, sometimes confusingly called a "normal solution," is one which has the same osmotic pressure as the liquid within blood cells, and is therefore "isotonic" with the blood. (Chemists define their normal solutions as containing the gram equivalent weight of a substance in one liter of solution. A physiological salt solution has less than one seventh as much salt in a given volume as a normal solution of sodium chloride as prepared by a chemist.) In certain conditions of the body, salt or any other ionizable sodium compound is practically excluded from the diet. Fairly recently it was proposed to substitute lithium chloride for sodium chloride and some was actually used by such patients. A thorough investigation by the United States Food and Drug Administration, based on extensive animal experimentation and clinical records, has proved that lithium chloride has distinctly toxic effects, particularly when consumed by those on a salt-deficient diet, and its use should be strictly avoided.

A serious agricultural problem is presented by the presence in soils of alkali salts, of which sodium chloride is typical. Alkali soils are in general quite unproductive and represent a very large and important proportion of the soil resources of the world capable of reclamation by modern methods. An important phase of the problem is the presence in soil of base exchange minerals. The part played by irrigation water is significant. Depending on the way in which water is applied to soil and the saline content of the water, soils may become more alkaline or the alkalinity may be reduced. The chief solution of the problem lies in the complete removal of alkali, prevention of its return, and repair of damage done. By proper irrigation methods, alkali salts may be removed from the soil to a depth to which plant roots reach and the rise of alkali from underlying layers prevented. Some methods of amelioration are of partial value. A recent example of soil reclamation is that of the farm land of Holland flooded by sea water during the German invasion.

Salt is produced in quantities exceeding most if not all other commercial chemicals and also exceeding most metals except iron. The peak of



Courtesy General Foods Corp.

A typical salt well, 2,400 feet deep.

production in the United States was reached in 1948, amounting to 16.4 million tons. The figure for 1949 was about 5 per cent lower than this, but higher than that of any other year except 1947 and 1948. World production is over two and one half times that of the United States. In the United States, the production by states in 1949 was distributed as follows:

Michigan	26	per cent
New York	19	" "
Ohio	14	" "
Louisiana	13	" "
Texas	11	" "
California	6	" "
Kansas	5	" "
Other States	6	" "
	100	per cent

SALT PRODUCTION IN THE UNITED STATES

	1935–1939 average	1942	1943	1944	1945	1946	1947	1948	1949
Evaporated	2,507,374	3,517,832	3,476,501	3,448,578	3,182,570	3,249,457	3,158,718	3,207,403	3,284,361
In brine	4,205,587	7,373,165	8,478,513	8,820,355	8,705,831	8,470,680	9,140,811	9,349,044	8,838,331
Rock salt	1,947,254	2,802,287	3,259,138	3,448,238	3,505,740	3,412,008	3,754,353	3,846,846	3,468,005
Total	8,660,215	13,693,284	15,214,152	15,717,171	15,394,141	15,132,145	16,053,882	16,403,293	15,590,697

Source: Bureau of Mines (short tons).

Considerably over half the sodium chloride sold or used as such is in the form of a concentrated brine. The remainder is fairly evenly divided between rock salt, mined and sold as a solid, and salt produced by evaporation of brines and crystallization, the former being slightly higher.

The average purity of rock salt is of the order of 98 per cent and it is used without further purification. Limited amounts of salt are produced by solar evaporation of sea water or water from salt lakes, but this is a minor source of this mineral in the United States, and is limited to regions where evaporation greatly exceeds rainfall. The brine is run first into shallow ponds and drops out sparingly soluble substances such as calcium carbonate and calcium sulphate. The partially purified and somewhat concentrated solution is run to another set of ponds in which a fairly pure sodium chloride crystallizes and is deposited. The remaining solution, called a bittern, contains the more soluble potassium magnesium, and calcium chloride is drawn off and discarded. The most common method of producing sodium chloride from brines is in multiple effect vacuum evaporators, in which heat is supplied to the first of a series of evaporators by steam in coils or in steam chests through which the brine circulates in pipes. A vacuum pump and condenser are connected to the last evaporator in series or the last "effect." Steam coming from the brine in the first effect is passed into the steam chest of the next evaporator in line, where it condenses and produces a vacuum over the liquid from which it came, its latent heat of condensation causing the brine around the steam chest into which it entered to boil. The vapor from this effect passes on to the next and so on until the last, whose vapor is condensed by cool water, the vacuum in this effect being produced by a pump. Such evaporators are usually equipped with conical bottoms connected to receivers called salt boxes in which the salt collects. The brine usually has a preliminary treatment with lime to remove most of the impurities. A somewhat inefficient system of evaporation still continues to be used because of the special quality of the salt crystals produced. In this system evaporation is brought about in a "grainer," an open pan or trough with steam coils raised slightly above the bottom. The tiny cubes of salt formed at the surface float for a time because of surface tension, and become surrounded by a rectangular rim. The crystal ultimately takes the form of an inverted hollow pyramid called a "hopper crystal," which sinks to the bottom of the grainer and is drawn out on a drain board and to the discharge end by reciprocating rakes. An ingenious method of removing insoluble products such as calcium sulphate is to pass hot concentrated brine through cylinders packed with pebbles. The undesirable material deposits on the pebbles. At intervals the cylinder is drained, rotated like a ball mill, and the deposit is ground off and discarded. Final crystallization in this case is in grainers.

The most familiar use of salt is in the seasoning of food in the kitchen and at the table. In damp weather salt takes up moisture and tends to cake. This is avoided by adding harmless substances such as magnesium carbonate, soda, calcium phosphate, and dextrose (corn sugar) in very small amounts. In regions some distance from the sea coast where the amounts of iodine in water and soil are low, a small amount of potassium iodide is added to table salt for occasional but not continual use.

Commercial salt finds many uses in which it is not changed chemically in any way. The preservation of food is probably the most familiar. Salt was at one time mixed with crushed ice in all sorts of refrigeration operations, and one process actually crystallized salt and ice together in thin flakes to produce temperatures well below that of melting ice alone. Modern refrigeration equipment has cut down this use. Salt is still an important material in the leather industry in the preservation of hides. In the older method of soap making in the kettle, dry salt is added at one stage of manufacture to cause the soap to curd and separate, the effect being that of an electrolyte in the coagulation of a colloid. Considerable salt is used on icy sidewalks and streets, and a limited use is recorded in treating unpaved roads. Pressed salt blocks are a common sight in pastures and stock-feeding pens. Freezing brines still contain sodium chloride, but calcium chloride gives a greater lowering of the freezing point and a greater range of cooling.

Finally, sodium chloride is the source in industrial chemistry of metallic sodium, of chlorine, and of practically all sodium and chlorine compounds. Some sodium carbonate and sodium sulphate are derived from natural deposits, but even these substances are derived largely from salt. Fused sodium chloride is broken up by the electric current into metallic sodium and chlorine, the product of principal value in this case being sodium. One of the chief uses of sodium is in the preparation of the common antiknock additive to gasoline, lead tetraethyl. An alloy of sodium and lead is treated with ethyl chloride. When a solution of sodium chloride is electrolyzed, the products are chlorine, caustic soda, and hydrogen,

the last named sometimes being allowed to escape. When mercury is employed as the cathode there is no problem of loss of chlorine by recombination, but when an iron cathode is used, diaphragms are required to keep the chlorine away from the caustic soda, the brine also flowing through the cell with only about one half of the salt being decomposed in each passage. Caustic soda is also made, but in smaller quantities, by the action of lime on a solution of sodium carbonate or soda. This chemical is itself made from salt, ammonia gas being passed into a concentrated brine, after which the ammoniacal brine is treated with carbon dioxide. An insoluble sodium bicarbonate separates, and is converted by heat to sodium carbonate. Since the original bicarbonate is heavily contaminated with ammonia, cooking soda is made by action of carbon dioxide on pure sodium carbonate, or soda ash. While some hydrochloric acid is made from hydrogen and chlorine, the hydrogen chloride being absorbed in water, and some also is a byproduct of other industries, most of this valuable acid is produced by the action of concentrated sulphuric acid on dry salt. Sodium cyanide results from the reaction of fused salt with calcium cyanamide. Other sodium compounds are more commonly made from soda ash or caustic soda, both of which originate from salt. Likewise most other chlorine compounds are made from the chlorine which is made from salt.

Consult Bureau of Mines *Minerals Yearbook, 1949* (Superintendent of Documents, Washington, D.C.); Phalen, W. C., *Salt: Industrial Minerals and Rocks*, American Institute of Mining and Metallurgical Engineering, 2d ed., pp. 807-843 (New York 1949).

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SALT LAKE CITY, city, Utah, state capital and seat of Salt Lake County, is situated at an altitude of 4,357 feet in north central Utah, 38 miles south of Ogden. Through the western part of the city flows the narrow, winding Jordan River whose headwaters are 50 miles south in Utah Lake.

The city has a picturesque setting in the Great Salt Valley, along the shoreline of a huge, Pleistocene body of water called by geologists Lake Bonneville. It lies at the foot of the snow-capped Wasatch Mountains, but mountain ranges are visible in all directions. From their canyons, including Provo Canyon in which is located Deer Creek Reservoir, water is brought into the city, assuring an adequate supply in a region where precipitation is light. Most of the city streets are long, straight, and wide; and in the downtown area, except during freezing weather, water flows down the streets and there are continuously-running drinking fountains on nearly every corner. The surrounding agricultural area produces sugar beets, vegetables, fruits, wheat and other grains, livestock, and poultry. The vicinity is rich in such mineral deposits as coal, iron, copper, silver, phosphate, gilsonite, and lead. One of the world's largest nonferrous smelting areas is that within a 50-mile radius of the city. From its farms, ranches, and mines come the raw materials for the city's industries.

Transportation.—The city is served by six railroads: the Union Pacific, the Western Pacific, the Denver and Rio Grande Western, the Bamberger (electric), the Utah, and the Salt Like, Garfield and Western (electric). Salt Lake City is on a network of modern highways, with motor-bus and truck service in all directions. It has two municipal airports and daily scheduled airline service. Nearby are three privately owned fields for charter flights and private flying.

Commerce and Industry.—Situated about midway between San Francisco and Denver, the city occupies a strategic commercial position in the intermountain region. It is that region's leading livestock market, enjoys a large wholesale and retail trade, and has nine banks, including a branch of the Federal Reserve Bank of San Francisco. It is the center of extensive industrial and manufacturing operations. Among its industries are printing and publishing, beet sugar refining, oil refining, copper refining, coking, and the smelting of copper, silver, lead, zinc, and iron. The processing of foods and the manufacture of textiles and of iron, steel, and clay products are also important.

Educational, Cultural, and Recreational Facilities.—Salt Lake City is the state's educational center. In addition to a modern public school system and private and parochial schools, located in the city are Rowland Hall (Episcopalian, girls' academy), Westminster College (Presbyterian, coeducational, 4-year junior), the College of St. Mary-of-the-Wasatch (Catholic, for women), the University of Utah (see Utah, *University of*), and the McCune School of Music and Art. Although Salt Lake City is known as a center of Mormonism, it is less generally known that it is the seat of Roman Catholic and of Episcopal dioceses. A number of other denominations are represented in its places of worship. Library facilities include the Salt Lake City Free Public Library, the Utah State Library, and the Church Historian's Library of the Mormon Church, which last includes much source material relating to the history of Utah. The cultural life of the city is also enriched by the Utah Symphony Orchestra, the Salt Lake Opera Association, the famous Tabernacle choir of 375 voices, the organ recitals given in the Tabernacle every weekday, and by the annual music festival sponsored by the university. In the State Capitol are several art collections, most of which represent the work of Utahns. Among paintings of special interest there are two very different portraits by Gordon Cope of the Ute Indian chief, John Duncan. One was painted to satisfy the sitter; the other, to satisfy the artist himself. An art gallery in the university includes a collection of paintings by artists who worked in Utah during its pioneer days. The Art Barn, meeting place of clubs interested in various forms of art, holds exhibits of contemporary artists from time to time. Among collections in the university's museums and in the Latter-day Saints (Mormon) Museum are some unusual archaeological specimens, the artifacts of ancient Indian cultures, and relics of Utah's pioneers and of the Mormon Church. In the Daughters of the Utah Pioneers Memorial Building (a replica of the Salt Lake Theater opened in 1862 and then the largest building in the West) is an unusually fine collection of pioneer relics. A similar collection is housed in the capitol, which also contains exhibits of the state's natural wealth and beauty.

More than 3,200 acres of the city's area are in parks, playgrounds, municipal golf courses, and other recreation centers. In Liberty Park's landscaped 100 acres is a lake used for boating

in the summer and ice skating in the winter. The park also contains a bandstand, an aviary, a hall of pioneer relics, as well as swimming pools, picnic grounds, and other facilities. At the mouth of Emigration Canyon is Hogle Park with a zoo that in 1951 contained a rare hybrid, a crossbreed of lion and tiger, appropriately named a liger. Memory Grove, a park area at the foot of City Creek Canyon, is dedicated to Utah's soldiers who died in World War I. Pioneer Park was developed on the site where the first Mormon settlers built their homes. The city also owns readily accessible mountain parks, including George Washington Memorial Grove, which covers 5,500 acres.

Notable Buildings and Monuments.—The State Capitol stands in 40 acres of landscaped grounds and occupies a commanding position on Capitol Hill. From it, the entire city may be seen. The capitol is a magnificent 4-story building, designed in classical style by Richard K. A. Kletting, a Salt Lake City architect. It is constructed of Utah granite, and its dome is covered with Utah copper. It was erected (1913–1915) at a cost of approximately $2,740,000. In addition to the previously mentioned features in it, the building contains a number of decorative works of art, including four murals and eight canvases representing important events in the state's history, several busts of people of historic importance in Utah, a replica of Cyrus E. Dallin's statue of the Indian chief, Massasoit, and a plaster cast of Dallin's *Signal of Peace*. The governor's reception room, known as the Gold Room, contains furnishings valued at more than $125,000, and its metalwork is of silver and gold mined in Utah. On the capitol grounds is the Mormon Battalion Monument, a memorial to the Mormons who fought for the nation in the Mexican War, designed by Gilbert Griswold. Several structures of interest are found in Temple Square. The basic conceptions of the Tabernacle and the Temple within it are credited to the Mormon leader, Brigham Young. The Tabernacle, designed by William Folsom and constructed in 1863–1867, is a large oval-shaped auditorium 250 feet long, 150 feet wide, and 80 feet high, with an ellipsoid roof and a gallery running almost the entire circumference of the inside of the building. Its seating capacity is 8,000, but it has held much larger audiences. Its original organ was the work of Joseph Ridges, and it was hand-carved and hand-built from native woods hauled by ox-team from the southwest corner of the state. When completed in 1874 it had 2,600 pipes, but since that time has undergone reconstructions and now has 10,746 pipes. The Temple was designed under Brigham Young's direction by Truman O. Angell, one of the first practicing architects of Utah. It is a six-towered edifice of native granite, 186½ feet long and 118½ feet wide, and its greatest height is at the east center tower, which reaches to 210 feet at the top of its stone work. Surmounting this tower is a heroic figure by Dallin in hammered copper covered with gold leaf, representing the angel Moroni of the Book of Mormon. The Temple was built between 1853 and 1893 at a cost of about $3,500,000. To bring the larger blocks of granite the 20 miles from the quarry to the Temple site during the early days of construction required four yoke of oxen and two to four days of time. The Temple and the Temple Annex, with which it is connected by a 90-foot passage, are open to church members only, but in the Assembly Hall, another building in the square, Mormon church services are open to the public. In and around the square are a log cabin erected in 1847, the first year of settlement; the life-size statues of the Mormon prophet Joseph Smith and his brother Hyrum by Mahonri Young, grandson of Brigham Young; the Seagull Monument, also by Young, erected in memory of the birds that saved the pioneers' crops; the Three Witnesses Monument by Utah-born Avard T. Fairbanks, erected to Mormons who played an important part in the church's history; and the Brigham Young Monument by Dallin, memorial to the first pioneers in Utah. At the mouth of Emigration Canyon a simple granite shaft had marked the spot where Brigham Young, traveling down the canyon with his group of settlers, first viewed the valley and is said to have stated, "This is the right place. . . ." Commemorating Utah's first century, a new and imposing "This Is the Place" Monument by Mahonri Young was unveiled in 1947. Of historical interest are the former dwellings of Mormon leaders, the mansions erected for the mining magnates of the late 1800's and early 1900's, and the simple adobe homes that trace back to the city's beginnings. Among non-Mormon church edifices of special interest are the First Congregational Church, erected in 1891 in Gothic style, which stands on the site where, in 1865, the city's first non-Mormon services were held; and the Roman Catholic Cathedral of the Madeleine, a beautiful building of gray sandstone constructed between 1900 and 1909 in German Neo-Gothic style.

Government.—The city has a commission form of government, with five commissioners and a mayor directly elected by the people on a nonpartisan ticket. The auditor is also an elective office. In addition to the municipal airports, the city owns and operates the waterworks. As the capital of Utah and seat of Salt Lake County, most of the functions of state and county government are centered in the city. There the federal government also maintains Fort Douglas, a veterans' hospital, a district court, and other agencies; and has made the city the headquarters for the National Grazing Service.

History.—The history of Salt Lake City is closely identified with that of Utah (see UTAH—*History*). Between July 21 and July 23, 1847, vanguards of the Mormon party under the leadership of Brigham Young arrived in the desert valley where Salt Lake City was to grow, and immediately began to insure a food crop for the winter. Young, who had been ill but had chosen the general location, arrived on the 24th with the main body of his group. Almost at once he selected the exact site for the erection of the Temple. City planning began and the Mormons settled down to a life of isolated self-sufficiency in a place where they hoped to build up the "Kingdom of Christ on Earth." Before September, these members of the Church of Jesus Christ of Latter-day Saints (or Mormons) had plowed, planted, and irrigated 100 acres. They had also filled nearly a block (10 acres) with adobe houses, and built "one line of log cabins in stockade." Despite their efforts, they spent an uncomfortable winter, and food was short. When spring broke, they were joined by other Mormons and, having planted several thousand acres, the prospects for a good harvest were promising; but a late frost and then a plague of crickets

almost ruined their crops, and they were saved from starvation only by the "miracle of the gulls" —huge flocks of the birds which suddenly arrived and, by feasting on the crickets, halted the devastation.

The settlement was under church rule; and all, from the highest of the church's officials to the lowliest of its members, were expected to work. In 1849, the leader of a federal surveying expedition who passed through reported: "A city has been laid out upon a magnificent scale, being nearly four miles in length and three in breadth. . . . Through the city itself flows an unfailing stream of pure, sweet water, which by an ingenious mode of irrigation, is made to traverse each side of every street . . . spreading life, verdure and beauty over what was heretofore a barren waste." That same year, the first store was opened in the "city" and gold seekers on their way to California stopped there to get supplies. The early church leaders encouraged home manufactures and the sale of surplus products, but they discouraged their people from prospecting and mining in the fear that interests would be diverted from the simple, self-sufficient life and that any news of mineral wealth would bring non-Mormons to the area. Until 1858, there were practically no non-Mormons in all of Utah; converts were joining those already there, and new settlements were being established. In 1851, under the territorial government, Great Salt Lake City (as it was called until 1868) was incorporated; but the capital was transferred from that city to Fillmore, where it remained until 1856. The following year (1852), a special conference was called in Salt Lake City by church officials during which polygamy was announced as a Mormon principle. Although the practice is said to have been followed by only two or three per cent of the Mormons, this announcement augmented the prejudices of non-Mormons and the difficulties Mormons long had with the federal government until the church finally reversed its pronouncement. Meanwhile, "open rebellion" in Utah against the United States was said to exist; and, when the news reached Washington, federal troops were despatched to put it down. In 1858, when the troops reached Salt Lake City, they found it deserted, Young having ordered his people to leave. The war was almost bloodless and quickly over, but federal troops remained in Utah until 1861, and before that Salt Lake City's population had returned, and been increased by camp-followers and miners who made of it a headquarters for gambling and drinking. Feeling ran high. Association between Mormon and non-Mormon was practically limited to trade, and that flourished. The lawless period passed but non-Mormons remained, and the first non-Mormon church (Congregationalist) was organized in 1865. During the 1860's the city developed in other ways. A theater was opened in 1862 and made Salt Lake City an important theatrical center. Work was started on the Tabernacle. Non-Mormons organized a Masonic lodge and were instrumental in establishing a public library. The Union Pacific Railroad reached Ogden in 1869, and in 1870 a railroad connected these two cities and gave Salt Lake City transcontinental railroad service. The city's population was already nearly 13,000, and the railroad helped to develop Salt Lake City as a trading and distribution point. It also broke down its isolation, changed it from a barter to a money economy, halted native manufacture, encouraged mining, and brought in more non-Mormons. In 1877, Brigham Young, political and ecclesiastical leader for 33 years and called by his people the Lion of the Lord, died in the city he had founded. In the early 1880's, of about 21,000 in population roughly a third were either non-Mormons or Mormons who had forsaken their church. In 1889, a chamber of commerce was organized in the city which ignored differences in religion, and had much to do with overcoming an ultraconservative attitude toward civic improvements. The character of the city began to take on increasingly more of the characteristics of other American cities. Commercial manufacture, stimulated by World War I, became even more important in the city's economy in World War II. In 1947 the city celebrated its centennial and among the events marking the celebration was a journey of the legislature from Salt Lake City to Fillmore, where one legislative session was held in the old State House occupied by the lawmakers of 1855–1856.

Population.—Reports of the Bureau of the Census show that since the first federal count was taken of the city in 1860, it has been the most populous city in the state. Pop. (1900) 53,531; (1920) 118,110; (1940) 149,934; (1950) 182,121.

SALT LICK, a place where salt is found on the surface of the earth, to which wild animals resort to lick it up; sometimes near salt springs.

SALT RANGE, India, a mountain system in Punjab, Pakistan, beginning on the south side of the Jhelum River, and extending west to the Indus River, reaching an elevation of from 3,200 to 5,000 feet. It consists of two chains running from east to west, which join in a high plateau; the general relief is bleak and dreary, while wildly picturesque. The mountains derive their name from the precipitous hills of solid rock-salt which occur on the border of the plateau. About 60,000 tons of salt are quarried annually, from the Mayo, Warcha, and Kalabagh mines. Coal and other minerals also are found.

SALT RIVER, (1) in Kentucky, has its rise in Boyle County, in the central part of the state; from whence it flows north, then west, then north by west to the northern boundary of the state, where it enters the Ohio River at Westpoint, about 20 miles southwest of Louisville. It is about 100 miles long; and the chief tributaries are Rolling Fork, East Fork and Beech rivers. (2) A river in Missouri, which has its source in Schuyler County, in the northeastern part of the state, flows south by southeast to Monroe County, turns east, then northeast and southeast, and enters the Mississippi River near the town of Louisiana, in Pike County. It is about 200 miles long, and is formed of three branches, North, Middle, and South Forks. (3) In Arizona, which has its source in Apache County, and flows west into the Gila River in Maricopa County. There is a system of dams (Roosevelt, Horse Mesa, Mormon Flat, and Stewart Mountain) linked by a 60-mile chain of lakes; the water is utilized for irrigation and for water power.

SALTA, säl'tä, or **SAN MIGUEL DE SALTA,** Argentina, (1) capital of a province of the same name, in the elevated and well-watered valley of Lerma (1,202 meters), about

800 miles northwest of Buenos Aires. It is a bishop's see, and has a cathedral. Other important features are: the main square or Plaza on which stand the Cabildo, or capitol; the *Colegio Nacional;* a branch of the National Bank, an orphan asylum, hospital and the above-mentioned cathedral. There is a brisk trade, especially transit trade with Bolivia. It is connected by rail with Buenos Aires and Jujuy. The chief products are corn, tobacco and wood. Pop. 28,436. (2) The province of Salta is situated in the northern part of Argentina, and covers an area of 48,302 square miles. Its frontier borders on Bolivian territory. At the west it is mountainous. The highest summits reach an elevation of 6,000 metres, the plateaus 1,300 to 4,000 metres, and some of the passes 3,600 metres. The Sierra Lumbre and the Sierra de Sanita Maria border on the Andes. The mountains contain rich mineral deposits of gold, silver, copper, nickel, iron and lead. The waterways are numerous: The Vermejo and its tributaries, Rio San Francisco and Rio Balle, and Rio Passage (del Juramento), which joins the Paraná as Rio Salado. The climate depends upon the altitude, and different crops are planted accordingly. The products are sugar, corn, wine and European fruits; barley, potatoes and fodder-crops. The lower slopes and valley contain the pampas; the high summits and plateaus are treeless. The inhabitants are for the most part a mixed race of Spaniards and Calchaqui Indians. Pop. about 175,000.

SALTER, William Mackintire, American author: b. Burlington, Iowa. 30 Jan. 1843. He was graduated from Knox College (Ill.) in 1871; studied for the ministry at Yale and at Harvard and was graduated as B.D. at the latter in 1876; subsequently he studied philosophy, as Parker-Fellow of Harvard University, at Göttingen, and political science at Columbia University. From 1883 to 1908 he was lecturer for the Societies for Ethical Culture in Chicago and in Philadelphia; from 1909 to 1913, a special lecturer for the department of philosophy in the University of Chicago. He is the author of 'On a Foundation for Religion' (1879); 'Die Religion der Moral' (Leipzig 1885); 'Ethical Religion' (1889); 'First Steps in Philosophy' (1892); 'Anarchy or Government? An Inquiry in Fundamental Politics' (1895); 'Walt Whitman' (1900); 'Nietzsche: the Thinker' (1914); 'What is Americanism?' (1925), and various articles in philosophical and literary periodicals. Died, Silver Lake, N. H., 18 July 1931.

SALTILLO, säl-tēl'yō, Mexico, capital of the State of Coahuila; situated on the Tigre River, 65 miles southwest of Monterey, near the border line between that state and its neighbor on the north, the state of Nuevo Leon, elevation 5,249 feet above sea-level. It was given the rank of city in 1827 and named Leon-a Vicario, or Saltillo, by which latter name it is universally known. It was noted for many years for the superiority of the serapes made by the Indians of the vicinity — a distinction, however, which has hardly been maintained in recent years. The battle field of Buena Vista, the scene of the defeat of the forces of Santa Ana, by General Taylor, in 1847, is but five miles distant, and near this are the baths of San Lorenzo. In the immediate vicinity are successfully grown all the fruits of the temperate zone and many which pertain to the tropics. The principal buildings are the Civil hospital, the penitentiary and the Acuñ-a Theatre, and the chief manufacturing establishments are cotton mills, flouring mills and soap and cotton seed oil manufactories. The city enjoys a favorable reputation as a health resort. The three principal educational institutions — the Juan Antonio de la Fuente School, the College of San Juan Nepomenceno and the Normal School maintain creditable museums and there are four public libraries — the State library and those connected with the three schools above named, which altogether contain over 6,000 volumes. The Bank of Coahuila, with a capital of $1,600,000, and agencies of the National Bank, the Bank of London and Mexico and the Bank of Nuevo Leon provide the financial resources of the community. Pop. 36,000.

SALTO, Uruguay, the capital of the department of the same name on the northwest frontier opposite Concordia, Argentina, and at the head of navigation for large vessels on the Uruguay River. It is the shipping port of the surrounding region, a rich stock-raising district, and is 250 miles northwest of Montevideo, the capital of the republic, with which it is connected by rail. Pop. of town 30,000, of department 82,846.

SALTON SEA, a lake in the wide Colorado Desert or Imperial Valley in Imperial and Riverside counties in southeastern California. Under ordinary conditions it is a salt marsh covered in places by shallow lakes, about 30 miles long, 12 miles wide and 280 feet below sea-level. At times of freshets the lakes expand into a water body covering from 40,000 to 50,000 acres. In 1905 and 1906 the basin was flooded by accidental influx of water from irrigation ditches from Colorado River and it became a sea 42 miles long, 10 to 16 miles wide and 93 feet deep covering an area of about 470 square miles. The surface of the water at this stage was 198 feet below sea-level. In 1907 the influx of river water was finally stopped by dikes and for a time the water area diminished because of the great excess of evaporation over the very scant rainfall. Water from the irrigating ditches of the Imperial Valley keep the level of the lake fairly constant, and unless this is diverted it will continue to maintain its present area, despite the heavy loss from evaporation. Terraces slightly above sea-level on the sides of the basin indicate that there was formerly present a lake, called Lake Cahuilla by Blake, which was more than 120 miles long and 30 miles wide. Consult Mendenhall, W. C., 'Ground Waters of the Indio Region, California, with a sketch of Colorado Desert' (U. S. Geological Survey, Water Supply Paper 225, 1911); Newell, F. H., 'Salton Sea' (Smithsonian Institution, Annual Report for 1907); MacDougal, D. T., 'The Salton Sea' (1914).

SALTONSTALL, sâl'ton-stâl, **Gurdon,** American colonial governor: b. Haverhill, Mass., 27 March 1666; d. New London, Conn., 20 Sept. 1724. He was graduated at Harvard in 1684, and became minister of the Congregational church of New London, Conn., in 1691. He succeeded Governor Winthrop as chief executive of Connecticut in 1708. and continued

in office until his death. The Saybrook Convention was suggested by him, and the historic «Platform» largely shaped by him. Through his efforts the first printing press was established in the colony. He was also active in the founding of Yale and in its establishment at New Haven.

SALTPETRE. See NITRATE OF SODA.

SALTPETRE, Chile. See NITRATE OF SODA.

SALTS, a very important class of substances in chemistry. The word salt was first used to designate the solid residue obtained by evaporation of sea water, and as sodium chloride is its chief constituent the term *salt* came to mean popularly that substance alone.

Many other substances besides common salt are known by the general name *salts* because of their similarity to common salt in general physical properties, such as solubility in water, taste, having crystalline form, etc. Some of the most common are saltpetre (potassium nitrate), smelling salts (ammonium chloride), etc.

The chemical meaning of the term salt is quite another thing. While the substances mentioned above are indeed salts in the chemical sense, many other substances, as oil of wintergreen, for example, that have none of the physical characteristics of common salt must also be included under this term. To the chemist, a salt is a chemical compound that may be considered as derived from an acid by the replacement of part or the whole of the hydrogen of the acid by a metal or a «radical» playing the part of a metal. For example, the salt sodium nitrate, $NaNO_3$, is derived from the nitric acid HNO_3, by the replacement of the hydrogen by the metallic element sodium, Na; also ammonium chloride NH_4Cl is derived from the hydrochloric acid HCl by similar replacement of hydrogen by the radical NH_4. The most general chemical conception of the composition of salts is that which formulates them as MxNy, where M is the basic or positive portion and N the acid or negative part of the salt. Both M and N may be either elementary atoms or groups of different atoms acting as single atoms (radicals).

Taking common salt (NaCl) as an example, the positive radical Na may be replaced by another metal, or by a complex group of elements which is positive as compared with the other component of the resulting salt. Likewise, the negative radical Cl may be replaced by some other non-metal, or by a group of elements which is negative as compared with the other component. When solutions of two salts are mixed it is quite common that the positive radicals make a more or less complete exchange of their negative partners. This exchange is called in chemical parlance, «reaction.»

Salts are formed in many ways; one of the most important being by the action of an acid on a base by which water and a salt are formed, the salt differing in properties from both the acid and base used. Thus hydrochloric acid and potassium hydroxide mutually react, the products being potassium chloride and water. $HCl + KOH = KCl + H_2O$. Salts are frequently formed by the action of an acid on a metal. Zinc and sulphuric acid forming the salt zinc sulphate and hydrogen $Zn + H_2SO_4 = ZnSO_4 + H_2$. A very common method for the formation of salts is by the process called double decomposition, whereby two new salts are formed when solutions of two salts are brought together. When a solution of barium chloride is added to a solution of sodium sulphate a white solid separates which is a new salt barium sulphate, while in the solution is another new salt, sodium chloride. $BaCl_2 + Na_2SO_4 = BaSO_4 + {}_2NaCl$.

Salts are often classified as normal, acid, basic and double. An acid having more than one hydrogen atom replaceable by basic atoms or groups may form both acid and normal salts according to whether a part or whole of that hydrogen is replaced. An acid salt is therefore to be regarded as potentially an acid. Sulphuric acid H_2SO_4 can form acid salt $KHSO_4$ and the normal salt K_2SO_4. An acid having three replaceable hydrogen atoms can form three varieties of salts. Phosphoric acid H_3PO_4, for example, can give two acid salts KH_2PO_4, K_2HPO_4 and a normal salt K_3PO_4. A basic salt is one derived from a base having more than one hydroxyl (OH) group and in which all of the hydroxyl groups have not been replaced by acid groups. Basic bismuth nitrate $Bi(OH)_2NO_3$ is derived from bismuth hydroxide $Bi(OH)_3$ by replacement of only one (OH) by the acid group NO_3. An acid salt still contains acid hydrogen and will unite with more base to form a normal salt. A basic salt still contains basic hydroxyl (OH) and will unite with more acid to form a normal salt. A normal salt contains neither acid hydrogen nor basic hydroxyl. The term double salt has been applied to two different classes of compounds, the dividing line between which is, however, often very faint. Acids having more than one replaceable hydrogen atom may form normal salts in which two or more different basic atoms or groups are combined with the acid group, as magnesium ammonium phosphate, $Mg(NH_4)PO_4$ or potassium sodium tartrate $KNa(C_4H_4O_6)$. Another class of double salts is formed by the union of two or more molecules of certain normal salts $K_2SO_4:AL_2(SO_4)_3$, $PbI_2:2KI$, etc. Double salts occur most commonly through the combination of one normal salt with another normal salt. One of these components will be a salt of a strong base which forms acid salts but not basic salts: the other component will be a salt of a weaker base which forms basic salts but not acid salts. That component which is the salt of the strong base, being the more acidic, appears as the negative radical; and the component which is the salt of the weaker base, being more basic, appears as the positive radical. Thus in the formula MxNy, in the case of double salts both M and N are in fact salts, and the double salt a union of a positive radical with a radical simewhat less positive.

Method of Naming Salts.— Part of the name is derived from the basic element or group present; thus those containing sodium are called sodium nitrate, nitrate of sodium, or often nitrate of soda, chloride of soda, etc. The other portion is derived from the acid element or group present. Thus salts derived from nitric acid are called nitrates; from hydrochloric acid, chlorides; from sulphurous acid, sulphites; from perchloric acid, perchlorates. It will be noticed that all but the last syllable is the same as the name of the acid and also

that this last syllable differs according to the last syllable of the name of the acid. An acid with a name ending in *ic* forms a salt with a name ending in *ate* (see exceptions below). One ending in *ous* forms an *ite* salt. A salt in which the acid part is a single element has the termination *ide*, even though the acid name ends in *ic*. Thus sulphur*ic* acid forms sodium sulph*ate;* sulphur*ous* acid, sodium sulph*ite;* hypophosphor*ous* acid, sodium hypophosph*ite;* hydrochlor*ic* acid, sodium chlor*ide*. Sometimes a single acid forms two salts with a single metal. In that case the two salts differ in the number of acid groups attached to one metal atom. Thus iron (ferrum), united with nitric acid forms two salts, $Fe(NO_3)_2$ and $Fe(NO_3)_3$. The first one, containing the smaller number of acid groups, is called ferr*ous* nitrate, while the other is ferr*ic* nitrate.

The naming of acid salts has called into use a few other terms. The acid sodium salt of sulphuric acid $HNaSO_4$ is called acid sodium sulphate or hydrogen-sodium-sulphate. With an acid like phosphoric H_3PO_4 having three acid hydrogens, we have H_2NaPO_4 di-hydrogen-sodium-phosphate or primary sodium phosphate, HNa_2PO_4 hydrogen-di-sodium-phosphate or secondary sodium phosphate. The normal salt Na_3PO_4 is also called tertiary sodium phosphate.

As has been said, the terms salt, salts, sal are often applied to various substances of household or medicinal use. A few of the most common are given below with a list of their correct chemical names. Sal soda, sodium carbonate; Epsom salts, magnesium sulphate; Rochelle salts, sodium potassium tartrate; saltpetre, potassium nitrate; sal ammoniac, ammonium chloride; salts of tartar, potassium carbonate; Glauber salts, sodium sulphate. See REACTION; SOLUTIONS.

SALTUS, sôl'tŭs, **Edgar Evertson**, American author: b. New York, N. Y., Oct. 8, 1855; d. July 31, 1921. Educated in French and German universities and at the Columbia Law School, Saltus first published a biography of Honoré de Balzac (1884), *The Philosophy of Disenchantment* (1885), and *The Anatomy of Negation* (1886), the last two a result of his studies in Germany. In his later years he became a theosophist. Much of his early fiction dealt with New York society, but he wrote historical novels and *Imperial Purple* (1893), a history of the Roman emperors that was one of his best-known works. His original and bizarre style was pleasing to many readers in the 1890's—the "Mauve Decade."

SALTVILLE, Engagement at, a Civil War battle. The extensive saltworks at this village in southwestern Virginia furnished the Confederate armies and a number of Southern states with their supply of salt. Not until the third year of the war did the Union forces make any serious efforts to destroy the works. On May 2, 1864, Gen. George Crook started from Charleston on the Kanawha in West Virginia to join Gen. Franz Sigel in the Shenandoah Valley. A column of 2,600 cavalry under Gen. William W. Averell was directed to destroy the works at Saltville and then to rejoin the main column under Crook. After a very difficult march through the mountains, Averell reached Tazewell Court House, where he learned that Saltville was well defended by earthworks and artillery and was held in strength by Gen. W. E. Jones. Accordingly, he abandoned the idea of an attack, and after a severe engagement at Wytheville on the 10th, joined Crook at Union on the 15th.

Late in September 1864 Gen. Stephen G. Burbridge, with a mounted force of about 5,000 men, advanced through eastern Kentucky to Prestonsburg and up the Levisa Fork of the Big Sandy River toward Saltville. He was met 23 miles from the town by a small brigade of Confederate cavalry, which delayed him two days, thus enabling Gen. John C. Breckinridge to gather about 3,500 men at Saltville. When Burbridge appeared before the town on October 2, he found the saltworks well defended, with Breckinridge in command. He made an immediate attack and was stubbornly resisted, but after a hard struggle he gained the right and center of the Confederate works. The Confederate left resisted all his efforts, and at 5 P.M. Burbridge withdrew from the contest, and abandoning his dead and wounded, marched all night toward Prestonsburg, there continuing his retreat. On Dec. 12, 1864, Gen. George Stoneman, with 5,700 men, started from Bean Station, Tenn., on a raid into southwestern Virginia. He attacked Saltville, carried it on the 20th, burned the town and destroyed the saltworks. See STONEMAN'S RAID FROM EAST TENNESSEE INTO SOUTHWESTERN VIRGINIA.

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SALTWORT. See SALSOLA.

SALTYKOV, Mikhail Egrafovich, Russian satirist: b. Tula Province, Jan. 15(27), 1826; d. St. Petersburg, April 30 (May 12), 1889. Under his pen name N. SHCHEDRIN he wrote the *Golovlev Family* (1876), which was his masterpiece, also a satirical history of Russia. Other works include *Messieurs et Madames Pompadours* and *History of a Town.*

SALUTES AND HONORS. Formalized gestures of respect to persons of superior rank have existed in all periods of history and in all cultures. They have taken many forms, including bowing, kneeling, prostrations, and various gestures of the hand and arm. The basic individual military salute —the raising of the right hand to the forehead or to the hatbrim or vizor—is a relatively recent development. Until the end of the 18th century junior officers saluted superiors and soldiers saluted officers by merely doffing the hat. Civilians still doff hats in a gesture of respect that may well hark back to the custom of the medieval knight who raised his helmet's vizor or uncovered his head before a feudal lord. The discontinuance of hat doffing by the military is attributed to a change of regulations made to spare at least the hats from the griming effects of black powder on hands during discharges of musketry. In the British and Dominion armies until 1918 the hand farthest from the saluted officer was used.

Soldiers armed with a rifle or carbine salute variously, depending on whether they are standing at order arms or marching with the piece at shoulder arms. A halted body of infantry salutes on command by presenting arms. An officer or soldier carrying a sword or saber at the shoulder, whether mounted or on foot, salutes by bringing the hilt to his mouth, then extending the point to the right and downward. The origin of this form of salute dates to the Middle Ages, when knights in a reli-

gious gesture kissed the hilts of their swords as symbolic of the cross of Christ. It was then a form of oath taking.

Salutes by artillery fire, whether by land or naval guns, are determined by service regulations of the various countries. However, such salutes rendered to friendly powers, or to their chief executives or sovereigns, always correspond exactly to those rendered by the saluters to their own nations and chief executives. Thus in France and the United States, where the salute to the flag, and *ipso facto* to the president, is 21 guns, a visiting president, chief magistrate, or sovereign likewise receives a 21-gun salute, the only difference appearing in the playing of the visitor's rather than the saluter's national anthem after the firing.

Regulations in Great Britain provide that a salute of 62 guns be fired for the birth, accession, or coronation of a sovereign. For "extraordinary and triumphal occasions," such as the opening, closing, or proroguing of Parliament by the sovereign, the salute is 41 guns.

Artillery salutes are sometimes "by salvos," that is, by the simultaneous discharge of several pieces of artillery, sometimes by hundreds of guns. Although the term salvo derives directly from the Latin *salve*, hail!, and so suggests a friendly greeting, it is often used in the sinister sense of mass synchronized gunfire at an enemy. Especially is this true of naval gunfire, corresponding to the volley fire of infantry. Until recent times gun salutes were fired with live ammunition. The failure to render such courtesies down to the end of the 18th century was a frequent cause of bad international relations and sometimes of hostilities.

In the United States a general of the armies and all cabinet members are entitled to 19-gun salutes, followed by four ruffles of the drum and flourishes of the trumpet, but with a terminal march rather than the national anthem. At all American army posts the signing of the Declaration of Independence is commemorated on July 4th by a 48-gun salute "to the Union," one gun for each state.

DRAKE DE KAY.

SALVADOR, săl'vȧ-dôr (formerly SÃO SALVADOR or BAHIA), city, Brazil, capital of the State of Bahia, is on the Atlantic and All Saints Bay 750 miles northeast of Rio de Janeiro. A seaport and Brazil's fourth largest city in size, Salvador has an airport, railway connections with the interior, and a well protected deepwater harbor. The chief industries are sugar refining, cacao processing, and the manufacture of tobacco, cotton textiles, furniture, and footwear. Besides these products it exports hides, carnauba wax, and industrial diamonds. Petroleum and natural gas have been found in the northern suburbs. Salvador is built on two levels connected by public elevators and graded roads. The lower level is the commercial center. In the upper town are parks, public buildings, hotels, shops, and a university with schools of law, medicine, engineering, and fine arts. Founded in 1549 as São Salvador by Tomé de Souza, first governor general of Brazil, the city was the capital of the country until 1763. Pop. (1950) 395,993.

SALVADOR, El. See EL SALVADOR.

SALVAGE, săl'vĭj, the act of saving a ship or cargo from extraordinary danger, as from fire, the sea, an enemy, or pirates. In commercial and maritime law: (1) a payment or compensation to which those persons are entitled who have by their voluntary efforts saved ships or goods from extraordinary peril. The amount of salvage to be paid is generally agreed on between the salvors and the owners of the property salved; but if they cannot agree, the sum to be paid, and the proportions in which it shall be paid, are determined by the Admiralty Court. The crew of a ship are not entitled to any salvage for any extraordinary efforts they may make in saving their own vessel. (2) The property saved from extraordinary danger by the voluntary efforts of the salvors. See also INSURANCE PATROLS; MARITIME LAW.

SALVARSAN AND NEOSALVARSAN. The term salvarsan is used commercially as the equivalent of dioxydiamido arsenobenzol, the formula for which is $C_{12}H_{12}O_2N_2As_2$. It is popularly known as 606 because its originators Ehrlich and Hata made that number of experiments and combinations with arsenical preparations before arriving at salvarsan. Its discovery was announced in the early part of 1911. It is also known as the Ehrlich-Hata preparation. The active element in this combination as indicated in the formula is arsenic of the tervalent form, the quinquevalent form being much less potent as a spirochaetocide. The aim and the hope of Ehrlich in his long series of patient efforts was to find a substance which in a single dose at a single blow should overpower syphilis (q.v.), a goal which he termed therapia magna sterilisans. A very ambitious project, almost an impossibility, and yet he barely missed it.

In the experimental work in which apes had been successfully syphilized with cultures of *Spirochaeta pallida*, contrary to the belief that animals could be inoculated with syphilis, Ehrlich's dream had been partially realized. Apes, including chimpanzees, had been sterilized, that is, they had been cured of experimental syphilis with a single dose of salvarsan, but in human beings this cannot be done. Still salvarsan is one of the greatest of human achievements in the field of therapeutics.

Remarkable results, not cures, have been obtained and may still be obtained with a single dose of salvarsan, especially if the disease is treated in the very early stage; but to produce such a profound effect as is implied in the *cure* of syphilis would require a larger dose than could be tolerated by a human being; it would produce a poisonous and probably a fatal result.

Salvarsan is prepared as follows: Sodium amalgam (28.8 grams of 4 per cent sodium) is added to 30 cubic centimeters of water and 32 cubic centimeters of 2*N*-acetic acid containing 4.98 grams of 3-amino-4-hydroxyphenylarsenious oxide. A yellow precipitate is produced. When the amalgam has been used up there is added 25 cubic centimeters of 2*N*-acetic acid and 28.8 grams more of the sodium amalgam. This procedure is once more repeated, when the reduction will be complete. The precipitate is then dissolved in 60 cubic centimeters of methyl-alcohol, and the calculated amount of methyl-alcoholic hydrochloric acid is added. The salvarsan hydrochloride is then precipitated by adding ether after filtering.

Commercial salvarsan is a pale yellow, bulky, micro-crystalline powder which is permanent when dry, but highly oxidized in air, and decomposes in aqueous solutions, and especially in those which are alkaline, even in the absence of air. It dissolves readily in water, methyl-alcohol, ethylene-glycol, and glycerol, and sparingly in ether and acetone. It has an alkaline

reaction. As found on the market it is generally mixed with impurities, and is quite variable as to its content of arsenic. For therapeutical use it must be dissolved in distilled, *not in boiled water,* for it has been found, or at any rate supposed that the albumen from the organisms in the water which has been boiled for the solution would vitiate the action of salvarsan when introduced into the body. Unlike mercury it may not be taken by the mouth nor rubbed into the skin by means of an ointment. It is used entirely by injection, three methods being possible, the subcutaneous, the intramuscular and the intravenous. The subcutaneous method has been practically abandoned for the substance remains within the tissues as an infiltrate, without producing any appreciable effect upon the spirochetes which are the cause of the disease. In fact it becomes a distinct source of harm, and cases have repeatedly been reported in which it has resulted in abscess and extensive neurosis of tissue.

Intramuscular injections have been approved by some physicians and discarded by others. The large muscles of the gluteal region are usually selected for this purpose and the injection into them is made deeply. The objections to this method are the intense and persistent pains which follow the injections and the continuance for a prolonged period of the infiltrations. These infiltrations do not terminate in suppuration but the salvarsan may become disintegrated and cause arsenical poisoning.

The form of injection which now receives the approval of the majority of experienced syphilographers is the intravenous.

The veins at the bend of the elbow are selected for the injection, the skin being first carefully sterilized. A tourniquet is secured around the arm and the injection is made into either of the veins which are thereby distended. After the operation of injection has been accomplished the wounded vein must be carefully dressed, this precaution being an important one.

It is also very important that the injection should not be made as a matter of office routine, but in the patient's house, or in a hospital where all necessary appliances are at hand. The patient should remain in bed from 24 to 48 hours after he has received the injection. The reaction which may be expected from an intravenous injection of salvarsan usually consists of slight elevation of temperature, chill, fever, headache and vomiting.

The quantity af salvarsan which should be used in an injection is from 0.4 to 0.6 gram. Death has been attributed to arsenical poisoning in some of the fatal cases, as large a quantity as three or more grains of arsenic having been liberated into the body by the disintegration of the injected salvarsan.

It is quite apparent that the danger which attends the intravenous method is much greater than that which attends the intramuscular. Contra-indications to the use of salvarsan are heart disease in various forms, including aneurism and dilatation, myocarditis and uncompensated valvular disease. It should not be used in cases of advanced nephritis, nor in those cases of tertiary syphilis in which the cerebral and meningeal symptoms are threatening, in arterio-sclerosis nor in the presence of high fever. Blindness and deafness have occurred after the injection of salvarsan but they have usually cleared up after a suitable course of treatment with mercury. It is now believed that syphilis cannot be cured with salvarsan alone but that it should be used in conjunction with mercury, except possibly in primary syphilis. "Sodium salvarsan," prepared by precipitating with alcohol a solution of salvarsan in aqueous sodium hydroxide in the presence of a stabilizer (such as sodium hydrosulphite, mannitol or other polyhydric alcohols), has proved satisfactory in the ambulatory treatment of syphilis. "Copper salvarsan," prepared by adding sodium hydroxide to a solution of salvarsan and a copper salt, has been found useful in the treatment of "sleeping sickness."

Neosalvarsan or **Novarsenobenzol.**— The untoward results which attended the use of salvarsan induced Ehrlich to continue his experiments in the hope of discovering a substance by which they might be obviated. In October 1911 he introduced Neosalvarsan or "Ehrlich 914" (the number indicating the total in the series of his experiments, from the beginning), a condensation product of formaldehyde, sulphoxylate of sodium and salvarsan. Its distinct advantage over salvarsan is that it is neutral in reaction, salvarsan being alkaline.

It is a dry powder which is readily soluble in water or preferably in a dilute solution of sodium chloride.

It is used by injection either intramuscularly or intravenously, and will not cause infiltrations like salvarsan, nor will it cause necrosis of the veins into which it is injected, nor will it produce the severe pain which is caused by salvarsan. Because of its neutral reaction it will modify or abolish certain distressing symptoms which have frequently followed the use of salvarsan including vaso-motor disturbances and congestions which have sometimes resulted in collapse, œdema of the face, diarrhœa, colic, etc. Larger doses of this substance may be used than of salvarsan of which it contains 66 per cent. It is always safer, however, to begin the treatment with a small dose, especially in women, and increase them as the indications may warrant. Thus the limits of dosage may be placed between 0.3 and 1.5 gram. The contra-indications are the same as for salvarsan.

A pronounced advance in the treatment of syphilis and kindred disorders has been made possible by the development of two other neosalvarsans, known as "Galyl" and "Ludyl," respectively, "No. 1116" and "No. 1151" of Mouneyrat's series. The first is an acidic substance dissolving in aqueous sodium carbonate to a neutral solution, and as such, very suitable for intravenous injection in the treatment of syphilis and other protozoal diseases. Ludyl is prepared by the Schotten-Baumann reaction from benzene-*m*-disulphonic chloride of salvarsan. Both galyl and ludyl, as used in the treatment of syphilis, have a very energetic spirillicidal action, while being but feebly toxic and well tolerated in the system. There is no apparent congestive action of the organs of the body following their use, and no secondary ill effect on the nervous system; while their action upon the blood and general nutrition is favorable.

Under the use of these substances, especially

when combined with mercury, the symptoms of syphilis rapidly improve, and the Wassermann test, which should be repeated every month or two, will indicate the progressive destruction and disappearance of the spirochetes.

There is no definite time limit within which salvarsan or neosalvarsan, in connection with mercury, should be used; it may be a year; it may be much longer. A persistent negative Wassermann reaction indicates the disappearance of the cause of the disease, but just when this limit will be reached it will be impossible to predict in any given case.

SALVATIERRA, säl-vä-tyĕr'rä, Mexico, city in the State of Guanajuato, on the Rio Lerma, and the Celayo-Acambaro railroads, 50 miles southwest of Queretaro. The chief industry is cotton-spinning. Pop. (1940) 8,341.

SALVATION ARMY. William Booth (q.v.), born in 1829 at Nottingham, England, was "converted" in 1844, ordained minister of the Methodist New Connexion in 1852, married Catherine Mumford in 1855 and seceded from the Wesleyans in 1862 in order to devote his whole energy to aggressive evangelism, especially among the poor who in large numbers had "lapsed" from the churches. In 1865, he raised a tent over a disused Quaker burial ground, so starting what came to be called the Christian Mission over which he presided as general superintendent. In 1878 the name of the mission was changed to Salvation Army and William Booth assumed the title of general, with autocratic powers, his wife being known as "the Mother of the Army." Trained workers on full time were commissioned as officers with assigned ranks, appropriate uniforms, orders and regulations to be obeyed and military discipline like "knee drill" or prayer. In "citadels" there was arranged the "penitent form" where multitudes of people of all classes in society, some of them victims of drink, vice, gambling and other evils, others quite respectable though lacking in spiritual satisfaction, confessed their sins and were reclaimed, marching henceforth under the "Blood and Fire" flag—Blood for atonement by Christ on the Cross, and Fire for the Pentecostal gift of the Holy Spirit. Unlike the contemporary revival led by Dwight L. Moody of Chicago, the Salvationist movement was from the first consolidated into a permanent organization, sometimes described as a religious order within the Protestant fellowship, but with this difference, that Salvationists, rejecting celibacy, married, every wife holding the same rank as her husband. At first, there was violent opposition to the processions, the music of brass bands, the street meetings, the ejaculations and the fearless witness of the army, the whole of which was dismissed by Thomas Henry Huxley with contempt as "corybantic Christianity." But far-sighted laymen like Earl Cairns, the lord chancellor, the earl of Shaftesbury, the conscience of his country, and John Bright, the Quaker statesman, recognized that here was an answer to deep-seated social needs with which the churches were not adequately dealing, and inquiries by Parliament, official and unofficial, allayed hasty criticism and established a confidence in the Salvation Army which, despite difficulties, is today wide as the world.

Control of the army and its properties was vested in the founder, William Booth, all of whose eight children, according to capacity, helped him. In 1890, Catherine Booth died and later three of the Booths drifted from the Flag. In 1896 Ballington founded the Volunteers of America. In 1902, Catherine (daughter) followed her husband, Arthur Sydney Clibborn into the "Zionist" camp of Dr. Alexander Dowie, and in that year Herbert Booth took up independent preaching. On the founder's death in 1912, William Bramwell Booth, his eldest son and chief of staff, became second general with power to name his successor. But in 1929 a High Council of Commissioners and Territorial Commanders selected Edward J. Higgins to be third general, and he was followed by Evangeline Booth, George Carpenter, and Albert Osborn. The strong guidance of the Booths was thus terminated but their achievement continued with undiminished momentum.

From 1880 onwards, the army spread overseas as an international crusade. The most remarkable expansion was in the United States where, under Evangeline Booth, the equipment of the army, valued at $1,500,000 in 1904, increased during thirty years to approximately $35,000,000. During disasters like the earthquakes in San Francisco and Japan and the explosion in Texas City (1947) the army has repeatedly rendered first aid, and in France, during World War I, the army won outspoken appreciation for its service among troops—a record fully sustained during World War II. In India the army has been among agencies caring for lepers, and at the request of the government it has handled criminal tribes with encouraging results. In 1947, the French government invited the army to supervise the clearance of Devil's Island in Guiana, including the repatriation of time-worn convicts.

The army's statistics are subject to disturbed conditions in the world. In 1949 the recorded number of officers and cadets was 28,000, and 15,500 other persons without rank were wholly employed. This large force conducts 18,000 corps and outposts, 1,800 social institutions and agencies, 1,000 day schools and 101 periodicals, including the *War Cry,* with a total circulation of 2,500,000. Salvation is preached to more than 100 countries and communities, addressed in more than a hundred languages. The work of the army in prisons, rescue and maternity homes, crèches, labor bureaus and many other fields is thus of recognized social significance. But within the personnel of the organization there is a never-flagging insistence on those definitely spiritual powers and impulses which from the first have animated the Salvationist as an envoy of the Gospel.

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P. W. Wilson.

SALVATOR, a name for the monitor lizard; also applied to the South American teju (q.v.).

SALVE REGINA, săl'vē rē-jī'nä, the first words of a prayer addressed to the Mother of Christ, in Roman Catholic religious services.

SALVIA, a large genus of the Labiatae, occurring in temperate or warm regions, sev-

eral living in the southwestern United States. They range in size from herbs to shrubs, in foliage from entire to pinnatifid leaves and in inflorescence, from axillary to panicled. The flowers are sometimes two inches long and of nearly every hue except yellow; and the floral leaves are often changed into colored bracts, adding to their brilliance. The genus is remarkable for the arrangements made for cross-fertilization. The blossoms have a two-lipped corolla, two rudiments of stamens and two polliniferous stamens. The latter stand at the entrance to the throat of the flower, have short immovable filaments and a very long connective between the two anther cells of which the lower is abortive. This connective is crescent-shaped, the horns pointing outward and rocks upon the filament in such a manner that a bee entering the blossom pushes back the lower arm and brings down the other on its back, so that the pollen-filled anther cell deposits part of its contents there.

Salvia officinalis, the common sage (q.v.) and many others are cultivated either for savory herbs or for their flowers; or, as in the Clarys (*S. selarea*), for colored bracts; or, as in *S. argentea,* for its wholly white foliage.

SALVINI, säl-vē'nē, **Tommaso,** Italian tragedian: b. Milan, 1 Jan. 1829; d. 1 Jan. 1916. He began his studies at Florence but showing a talent for acting, his father, who was an actor, put him under the instruction of Gustavo Modena and at 16 he entered upon his stage career. In 1849 he left the stage to take part in the war of Italian independence, was made a corporal and served throughout the siege of Rome. He returned to the stage the following year and acted in the company with Adelaide Ristori. He soon began the study of those parts that he later played with such success, Orosmane in 'Zaïre,' 'Oreste,' the 'Saul' of Alfieri and Shakespeare's 'Hamlet' and 'Othello.' His success in Italy was such as to warrant him in looking abroad for honors and he next appeared at Paris where the critics were equally enthusiastic in his praise. In 1865 he took part at Florence in the celebration of the 600th anniversary of the birth of Dante, reciting passages from the 'Divine Comedy.' He played in various cities of Spain and in 1871 went to South America to play at Montevideo, Buenos Aires and Rio de Janeiro. In 1873 he appeared for the first time in the United States, enacting Othello at the Academy of Music, New York, 16 September. In 1875 he appeared in London. He afterward played in many parts of Europe and again in America in 1880, his supporting company being American actors, speaking English while he spoke Italian. He made five visits in all to the United States; in one of these (1886) playing Othello to Edwin Booth's Iago and the Ghost to the other's Hamlet. He retired from the stage in 1891. Besides parts already mentioned he appeared with distinction in the Egisto of Alfieri's 'Merope'; Palo in 'Francesca da Rimini'; Œdipus in a play of that name written for him by Nicolini; Conrad in 'La Morte Civile'; in 'Sampson, the Gladiator,' 'Macbeth,' 'King Lear,' 'Coriolanus,' and finally in 1891 at Florence as Iago. Consult Winter, William, 'Shadows of the Stage' (New York 1892); id., 'The Wallet of Time' (ib., 1913); 'Leaves from the Autobiography of Tommaso Salvini' (London and New York 1893).

SALVINIA, a genus of an aquatic family (*Salviniaceæ*) of cryptogams. They are floating plants, widely distributed in warm regions and not far removed from the ferns. *S. natans,* common in southern Europe and tropical America, has a sparingly branched stem lying on the water and develops three leaves at each node; two of these float as oval, green, and papillose foliage, hairy underneath, while the submerged third is divided into numerous hairy filaments, hanging like tassels in the water and metamorphosed into absorptive organs, that appear to be true roots, but are not. The spherical sporocarps, or sori, are borne near the junction of these filaments with the stem and are generally in groups of three, each enclosed in a cuplike growth from the filament, like the indusium of a fern and enclosing unisexual sporangia. The sporangia are composed of either microspores or macrospores. The microspores form antheridia and liberate spermatozoids which fertilize the archegonia developed by the macrospores. Several species of the *Salviniaceæ* are useful in aquaria.

SALWIN, säl'wēn, **SALWEEN,** or **SALUEN,** Burma, the most important river of the country. It has its source in the Tanla Mountains, south of the Kuen Lun, drawing also from the Kara Nor, some of its water. At its source, it is known as Nagtschu, and consists of the united volume of water coming from the glaciers of the mountain streams rising on the Tibetan plateaus. Its name among the Chinese is Lu-Tse-Kiang. The Burmese call it Thanlwin. About 160 Kilometers from its mouth appear many dangerous rapids, a great menace to navigation. The current is variable. It is a wild and picturesque stream, whose aspect varies greatly in the dry and wet seasons. After the rains the water washes high up the slopes against the trees of the forests; the average difference between high and low water amounting to from 50 to 90 feet. In the lower part of its course, islands also obstruct navigation (not visible at high water). The worst part is the gorge between the Yônzalin and Kyankhnyat rivers. Many ferries are used to cross the river and at these points villages are built on the heights above. There are a few bridges in Chinese territory. The Salwin's chief tributaries are the Nam Yu, Nam Oi, Hsipa Haw, Nam Nim, Nam Ting, Nam Kyek, Nam Nang, Nam Koa, Nam Hka and Nam Pang — its largest tributary,— the Nam Hsim, Mē Sili and Mē Sala; the Nam Hang, Nam Pan, Nam Teng, Nam Pawn, the Thaung-yin and the Yônzalin. The Salwin cuts the British Shan states almost in two. Kyodam, the great timber depot, lies 30 miles below the junction of the Thaung-yin and the Salwin. A cable stretched across the river at this point catches all the timber (teak), which is made into rafts and floated down to Kado near Maulmein (where the revenue is collected). From Kyodan southward and as far as Shwegôn, 63 miles from Maulmein, boats and steamers of light draft can safely navigate. The area of the Salwin Basin is 62,700 square miles. Its length 800 miles, breadth from one to four miles.

SALZA, zält'sä, **Hermann von,** grand master of the Teutonic Order: b. Germany, about 1170; d. Barletta, Italy, March 19, 1239. Appointed grand master about 1210, he became councilor to Frederick II, Holy Roman emperor, whom he accompanied in the attack upon the Saracens at Damietta, Egypt, in 1221; he was also with the emperor on the Fifth Crusade, in 1228–1229. In 1230 he was instrumental in effecting a reconciliation between the sovereign and Pope Gregory IX; and in 1235 he persuaded Henry, elder son of Frederick, to abandon the revolt which he had incited against his father's authority. Powerfully supported by pope and emperor alike, Salza was enabled to raise his order to the height of its power, with all privileges enjoyed by older orders and with great territories extending to the eastern frontier of Germany.

SALZBRUNN, zälts'brŏŏn, Poland, a group of three villages in Lower Silesia (Schlesien), 30 miles southwest of Wroclaw (Breslau). Since the 14th century Salzbrunn has been known as a watering place, the alkalo-saline waters of its eight mineral springs being especially adapted to pulmonary complaints; thousands of people visit the springs each year, and bottled waters are also exported. There are coal mines in the district; and industrial works which include glass and porcelain factories, wire-making plants, and wool looms. Salzbrunn had lain within Germany until 1945, when extension of the Polish frontier westward had been sanctioned by the United States, Russia, and Great Britain pending the signing of the World War II peace treaty. Pop. 13,761.

SALZBURG, zälts'bŏŏrk, Austria, (1) capital of the province of that name, occupies a position of singular beauty on the Salzbach, 87 miles southeast of Munich. It lies in a valley from which tower the wooded slopes of the Salzburg Alps. The steep sides of the Mönchsberg rise from the midst of the town, rocky and rugged. In the ancient cemetery of Saint Peter, the vaults are hewn in rocky clefts. Many of the private and public buildings are handsome marble structures and are suggestive of the Italian. Shady promenades skirt the winding river. The cathedral is a fine specimen of Renaissance architecture, built in 1614–1628 in imitation of Saint Peter's. A monument to Mozart, who was born here, stands in Mozart Platz. The present palace of the archbishops is an imposing edifice, opposite to which are the government offices and law courts. Across the river is the Mirabell palace, once the summer residence of the prince-archbishops. There are 24 churches, a theological seminary, fine libraries, and a museum. Salzburg is a very popular summer resort, which contributes much to its development and progress. A park, theatre, art gallery, and baths are among striking improvements. There are numerous benevolent and charitable institutions. Salzburg engages in a variety of small manufactures, such as musical instruments, marble ornaments, ironwares, cement, and artificial wool. Its trade is improving. Its origin and development were equally ecclesiastical, its archbishops German princes. The monastery and bishopric founded here (500–700) by Saint Rupert of Worms, was the nucleus of the present town. It has been the scene of several religious conflicts and is distinctively Catholic. Pop. 77,523. (2) The province covers an area of 2,762 square miles. It is characteristically mountainous with longitudinal valleys intersecting the hills. Of the 200 lakes, Lake Zell is celebrated for its wondrous mountain panorama. It has many mineral and thermal springs and valuable mines and forests. Pop. 267,169.

SALZKAMMERGUT, zälts'käm-ĕr-gōōt, Austria, an Alpine district, some 230 square miles in area, partly in Styria and partly in the provinces of Lower Austria and Salzburg. Because of its magnificent lakes and mountainous scenery it has been termed the "Austrian Switzerland." The lakes include Atter, Traunsee, Hallstätt, and St. Wolfgang; Dachstein, 9,830 feet in height, is the highest peak. The principal resort town of the Salzkammergut is Ischl. The district derives its name (in German meaning property of the salt administration) from the extensive deposits of salt.

SALZMANN, zälts'män, **Christian Gotthilf,** German Protestant clergyman and educator: b. Sommerda, Thuringia, June 1, 1744; d. Schnepfenthal, Oct. 31, 1811. Educated at Jena, from 1768 till 1781 he served as pastor, and for the next three years he taught morals and religion at the Philanthropinum in Dessau. A believer in natural religion, in 1784 he established at Schnepfenthal a school organized on especially broad principles. Salzmann, who held the theory that isolation was a requisite of moral education, was a determined opponent of many methods of teaching then in force, contending that the faults of the pupil should justly be credited to the teacher. His school, which attained a considerable reputation, was continued after his death. His writings on educational matters were extensive, most of them being in the form of fiction or of satire upon prevalent practice in instruction. Among his works were *Krebsbüchlein* (1780); *Karl von Karlsberg* (1780–1786); *Konrad Kiefer* (1794); *Ameisenbüchlein* (1806). His collected works were published in 12 volumes at Stuttgart in 1845–1846. Subsequent editions of his collected works include those of Wagner in *Klassiker der Pädagogik* (1900) and Ackerman in *Bibliothek pädagogische Klassiker* (1897–1901). His school published a *Memoir* of him in 1884.

SAM HOP TONG, a Chinese secret fraternity. According to tradition, it has existed since the establishment of the Chinese nation. Its history can be traced back to the 17th century when, as a patriotic organization, it helped to overthrow the Ming dynasty. Subsequently its character changed, the society becoming an association of men banded together solely for purposes of murder, robbery, and blackmail. With migration of Chinese to the west coast of the United States in the 19th century the Sam Hops, known as the Chee Kung Tong in California, engaged in many criminal activities. The movement was brought to light in San Francisco in 1891, but little success in checking it was achieved until 1898, when Chinese business men appealed to their home government for assistance. As a result, hundreds of arrests were made and within a short time the society virtually ceased to exist.

SAMAL, sä'mäl, an island of the Philippines in the northern part of Davao Bay forming the east shore of Pasiputan Strait, length 17

miles, width 13 miles, area 140 square miles. Its general elevation is 820 feet, some parts of the shores are low and wooded and other portions are high and rocky. The soil is fertile, and chocolate is the chief product; excellent timber is also obtained. The island is administratively part of the province of Davao.

SAMALES, sä-mä'lēz, a small tribe of the Philippine Islands, living on the Samales Group, at the northeast end of the Sulu Archipelago. They are of the Malay race.

SAMANA, sä-mä-nä', BAY, Hispaniola, an indentation of the eastern coast of the Dominican Republic, 30 miles long and 10 miles wide. It affords an excellent anchorage, being well sheltered and deep. On the north side of the bay is the town of Samana (pop. 1,638), capital of the province of Samana (pop. 31,243). Cacao, bananas, and coconuts are shipped through the port of Samana. Because of its strategic position between the United States and the Isthmus of Panama, in 1870 the American government negotiated a treaty for the purchase of Samana Bay, but the transaction was not completed on account of the United States Senate's refusal to ratify.

SAMANID, sä-män'ĭd, a native dynasty of Persia (Iran) of the 9th and 10th centuries. It was founded in 874 by Nasir I, great-grandson of Saman, a Persian noble of Balkh who was converted from Zoroastrianism to Islam, and for whom the line was named. The capital was at Bokhara. Persian literature and art were greatly aided by the successive Samanid rulers. The dynasty came to an end in 999, when Abdalmalik II was overthrown by the Ghaznevids.

SAMAR, sä'mär, an island of the Philippines, the third in size of the archipelago. It lies southeast of Luzon, in the extreme northeastern part of the Visayan group and east of Leyte, from which it is separated by the narrow Strait of San Juanico; length northwest and southeast 156 miles; width 75 miles; area 5,198 square miles, with dependent islands 5,488 square miles. A central mountain chain traverses the island from northwest to southeast, being divided near the center by the valley of the Ulut River; there is also a group of mountains in the extreme northwest. Their height rarely exceeds 1,700 to 1,800 feet. The island has a number of rivers, of which the largest and most important are the Oras and Ulut on the east, the Bató on the north, and the Gándara on the west, and there are four lakes. Among the natural curiosities is an arch over the Basey River formed by two limestone rocks from 34 to 40 feet high. In the rocks on the left a cave opens 37 feet above the water, which is 94 feet deep; it has been partially destroyed by the caving of the rocks overhead. The place is known as the *Cuevas de Sojotón.* The soil of the island is fertile, being adapted to the production of all the staples of the Philippines. The most important products are hemp, sugar, rice, and coconuts; coffee, cacao, tobacco, and wheat are also cultivated in abundance. A number of medicinal plants grow on the island, the most famous being the one producing the seed called "isigud," or the "fruit of San Ignacio," also known as "Catbalogan seed," because large quantities of it are grown near the town of Catbalogan. This is highly prized by the Chinese as an efficacious remedy for cholera. Valuable timber is found; bamboo and rattan are abundant, and wax and honey are obtained in large quantities. Coal, gold, and copper are found in the mountains. The raising of horses, cattle, hogs, and goats is an important industry. Sugar and cocoanut-oil are manufactured, and there are other manufactures for domestic use. Though there are few roads in the island there is good communication with the interior by means of the rivers, which are navigable for native boats. There is also an extensive coastwise trade, and trade with Manila. The people of Sámar are of Visayan blood, representing most fully the characteristics of the Malay race. In the mountains of the interior there are a few thousand primitive people who have not yet been brought under civilizing influences. The island of Sámar, with its adjacent islands, was constituted a province and placed under civil government in 1902. The population of the island numbers 470,678; and that of the province, 546,306.

SAMARA, former name of Kuibyshev (q.v.).

SAMARANG. See SEMARANG.

SAMARIA, sà-mâr'ĭ-à, Palestine, (1) the ancient capital of Samaria, 36 miles northwest of Jerusalem, occupied the acclivity of an isolated and abrupt height—Mount Sameron, which is separated from the surrounding mountains by a rich and well-watered plain. The town rose in terraces from this plain to a height of 400 or 500 feet. Samaria was the capital of Northern Israel from the date of its foundation by Omri, about 925 B.C., to the time of its capitulation to the Assyrians 721 B.C. The site was selected by Omri for a stronghold and capital, as commanding two of the most important highroads. The situation surpasses greatly that of Jerusalem, though not so picturesque. It commands, however, a charming view toward the Mediterranean, the mountains of Schechem, and Mount Hermon. The most important ruins are those of the time of Herod. It was in Samaria that the 10 tribes of Israel founded their independent state after the revolt, perpetuating their mutual animosity by incessant warfare. Thus the name Samaritan became a term of bitter reproach. This antipathy was religious as well as political, but was later mitigated by the return of the Samaritans to the ancient form of worship, and by the erection of a temple, modeled after that of Solomon in Jerusalem, soon after Alexander the Great had passed through Syria. Samaria having been presented by Augustus to Herod, he rebuilt the city, which had been the residence of all the kings of Israel till its overthrow by the Assyrians—calling the new temple Sebaste, in honor of the donor. An old church or mosque, once dedicated to John the Baptist, in the adjacent village of Sebastieh, marks the scene of that saint's burial or martyrdom. In World War I the city was in the zone of military operations by the British against the Turks, resulting in the surrender of Jerusalem, Dec. 10, 1917; it had been in possession of the Mohammedans, with two brief intervals, for more than 1,200 years. (2) Samaria, the name also given to the kingdom of Israel and the subsequent Roman province forming the central portion of Palestine; it stretched southward from the Plain of Esdraelon, declining south of Hebron into the desert plateau of Et Tih.

SAMARITAN LANGUAGE AND LITERATURE, the tongue and literary productions belonging to the inhabitants of Samaria, a region in Central Palestine of indefinite boundaries, possessing a capital of the same name.

Samaritan Language.— The Samaritan language was formed of varied elements gradually collected and assimilated from the Hebrew, Chaldee and Syriac. Greek, Latin, Persian and Arabic also contributed words to this dialect which grew up among a people isolated and even secluded in some respects, but through whose territory passed the immemorial trade route which connected Egypt and Africa with Assyria and the far East. Thus roots and heterogeneous scraps of language were jumbled together in the vernacular of an illiterate people, whose grammar was irregular, whose orthography was uncertain; there appears a complete confusion between the gutturals and cognate letters severally; quiescents or silent vowels prevail, and while vowel sounds are uncertain that of a is the most prominent. When the Arabians conquered Palestine in the 7th century this language gave place to that of the conquerors excepting among the priests, where it survived as the language of religion and ritual; thus it shared the fate of Hebrew among the Jews, Latin in Italy and the Roman provinces and Sanskrit in Hindustan. Like all Semitic languages it is read from right to left and the alphabet consists only of consonants, namely, alaf, bith, gaman, dalat, i, ba, sen, it, tit, jud, kaph, labad, mim, nun, simcat, in, phi, sadi, goph, rish, shan, tav. The two vowels with which certain words begin have a slight consonantal value. There are no accents or other diacritical symbols and no vowel points as in other Semitic languages, but some consonants are used as vowels. The numbers are written as in Hebrew. The characters appear in two forms, one of which is found in manuscripts, the other being confined to engraved inscriptions.

Samaritan Literature.— The literature of the Samaritan people consists of many departments, including grammar and lexicography. Three grammatical treatises on the Samaritan language were published from a manuscript at Amsterdam in 1862. They expound the theories of certain Arabian grammarians, from whose philological works whole passages are copied word for word. The Samaritan pronunciation may be judged of by the transliteration of Hebrew words into Arabic. No Samaritan lexicon has yet come to light. The lexicography, therefore, of the language is in an inchoate condition. The nearest approach to a glossary is to be found in the fragments of 'Tardeschemans' (interpreters) Hebrew-Arabic dictionaries now preserved in the Library at Leningrad. There are also at Paris in the Bibliothéque Nationale des Anciens Fonds a concordance of forms occurring in the Scriptures with the Arabic and Samaritan words in parallel columns. The Imperial Library at Saint Petersburg also possesses some Samaritan calendars, or astronomical tables. In legendary lore are several extant manuscripts. The British Museum possesses a 'Commentary on the Legends ascribed to Moses,' which is largely a compilation from Jewish sources. Of a similar character is the 'Jewelled Necklace in Praise of the Lord of the Human Race,' that is, Moses, who is credited with a divine nature, while great emphasis is laid upon the circumstances of his birth and the miracles he wrought. These two are typical of a somewhat extensive Samaritan legendary literature. The Samaritan commentaries on the Pentateuch are many in number and interesting as showing the doctrines of these people. It abounds in quotations from the Pentateuch, the prophets and the Mishna, and avoids all references to the Deity which imply an anthropomorphic conception. A number of fragments from the commentaries are also preserved at Saint Petersburg. The Samaritan 'Chronicle or Book of Joshua,' sent to Scaliger by the Samaritans of Cairo in 1584, seems to have revised and redacted into its present form about 1300 A.D. from four special manuscripts, three Arabic and one Hebrew, that is Samaritan. Among other things it relates that "King Joshua" waged war with 300,000 mounted men against two kings of Persia, and was succeeded on his throne by five "royal" rulers — the last being Sampson. The 'Chronicle of Abulfath' covers a period from Adam to Mohammed and is full of the wildest fables. Consult Uhlemann, 'Institutiones linguæ Samaritanæ' (Leipzig 1837); Petermann, H., 'Brevis Linguæ Samaritanæ Grammatica' (Berlin 1873); Gesenius, W., 'De Pentateuchi Samaritanæ indole' (Halle 1815); Brüll, A., 'Kritische Studien über Samaritanische Fragments in Oxford (Frankfort 1875); Kohn, S., 'Zur Sprache, Litteratur und Dogmatik der Samaritaner' (Leipzig 1876); id., 'Samaritanische Studien' (Breslau 1868); Cowley, 'The Samaritan Liturgy' (Oxford 1909).

SAMARITAN PENTATEUCH, an ancient version of the books of Moses, which has been preserved by the Samaritans, and along with the book of Joshua, constitutes their sacred scriptures. The Samaritan Pentateuch is most probably a recension of the same original as that from which the Jewish came, and possesses an independent value in determining the text. It is written in a non-Hebrew character, probably older than that of the Hebrew Septuagint. A manuscript copy of the Samaritan Pentateuch is in existence which is said by the Samaritans to have been written by Abishua, the great-grandson of Aaron. There are various other manuscript copies of this version, besides a translation of it in the Samaritan vernacular and one in Arabic, which after the 7th century superseded Samaritan as the language of the people. The work was known only through Origen, Jerome and other early writers until Pietro della Valle discovered a copy of it at Damascus in the 17th century. There are now several printed editions. See SAMARITAN LANGUAGE AND LITERATURE.

SAMARITANS, so called from the city of Samaria, the capital of the kingdom of Israel, and from Samaritis, the region adjoining that city. The policy of the Israelitish kings was, as a rule, to keep their subjects apart from too close association with the kingdom of Judah, and the breach between the two peoples was made wider, when, after the captivity of Israel, Assyrian colonists intermarried with the remnant left behind by the conquerors, and the

Samaritans ceased to be of purely Hebrew descent. The New Testament shows the aversion with which they were regarded by the Jews in the time of Christ, and even to this day when the Samaritans are represented by a few families still worshipping at Mount Gerizim, the dislike with which the Jews look upon them is as strong as ever. The Samaritans claim to be purely Mosaic in their creed, and that the Jews have departed from the ancient teachings of Israel. They worship one God, practise circumcision and the purifications, and keep the feasts, except the Purim and the feast of the Dedication. They look for a Messiah and believe in a resurrection from the dead and retribution in a future life for wrongs done in the present one. They marry among themselves only and practise polygamy in a limited degree. See also JEWS AND JUDAISM; JEWISH SECTS.

SAMARKAND, säm-ar-känd' (ancient, MARCANDA), Uzbek Socialist Soviet Repub., chief town of the former province of that name, and formerly capital of Sogdiana, in a fertile valley, 130 miles east of the city of Bokhara. The citadel stands at the west and beyond is the newly-built town. The Righistan, or main square, is of unrivaled beauty in its architectural features. The principal buildings are a palace, the bazaars, the Ulg-beg *madrasa,* or college; the tombs of Timur and his wives; two other colleges of the 17th century—splendid buildings, highly decorated with arabesques, enameled tiles of various colors, rich marble, and inscriptions of gold, etc., and 250 mosques. There is a brisk trade, and the chief items of commerce are cotton, silk, wheat, rice, horses, asses, fruit and cutlery. Gardening is the principal occupation, and there is some manufacturing. Wheat, rice and silk are exported, chiefly to Bokhara; silkwares, fine fruits, and rock-salt are imported. Samarkand has been for more than two centuries a great Asiatic mart. As Marcanda, it was taken by Alexander the Great. It had a checkered history; taken in 712 by the Arabs, it finally fell into possession of the Russians in 1868. In 1925 the province of which Samarkand was the capital was included in the Republic of Uzbekistan, created in that year as one of the constituent states of the Soviet Republic out of the republics of Bokhara and Khiva. Pop. of city 154,600; Republic (1933) 5,044,300.

SAMARSKITE, a rare and exceedingly complex, velvet black, nearly opaque mineral, occurring mostly massive, rarely in crystals. It is distinguished by its dark reddish-brown streak, splendent, vitreous to resinous lustre and conchoidal fracture. Its hardness is 5 to 6, specific gravity 5.6 to 5.8. Its usually rough crystals are rectangular prisms of orthorombic symmetry. It is a niobate (and tantalate) of iron uranium, and the cerium and yttrium metals. It is chiefly remarkable for the large number of rare metals which it contains, including samarium, terbium, gadolinium, and the doubtful mosandrum, decipium and phillipium. Its only European locality is Miask, Russia, but it is found sparingly in Canada, also in the United States in Connecticut, Maryland and Colorado. The only localities of commercial importance are in North Carolina.

SAMBOURNE, săm'born, **Edward Linley,** English cartoonist: b. London, 4 Jan. 1845; d. 3 Aug. 1910. He was educated at the City of London School and Chester College, and at 16 became an engineering draughtsman. In 1867 Mark Lemon, editor of *Punch,* accepted a small drawing from his hand, and he soon formed the connection that lasted through life. In 1871 he was given a seat at the table and in 1901 he succeeded Sir John Tenniel as chief cartoonist. He had practically no artistic education, but developed for himself an original style after first showing some inclination to the methods of Leech and Keene. He displayed ingenuity and firmness of touch, and a classic feeling for line. He was perhaps the least humorous of the *Punch* artists, being weighted with a strain of seriousness and dignity. He illustrated Burnand's 'New History of Sanford and Merton' (1872); Kingsley's 'Water Babies' (1885); 'Hans Andersen's Fairy Tales' (1887), etc.

SAMBRE, säⁿbär, river of France and Belgium, a tributary of the Meuse. It rises in the northern part of the French department of Aisne, flows between steep and rocky heights, receives several smaller streams, and finally, after a very tortuous course, empties at Namur into the Meuse. The Sambre is 110 miles long. It is navigable from Landrecies for 148 kilometers, and from that point for 67 kilometers is canalized, having 10 locks. The Sambre Canal passes southward as far as Oise, connecting the Seine and Maas. Practically the vicinity of the entire length of the river in France formed a vast battlefield after the Teutonic armies had invaded France in the early part of the great World War.

SAMBUKE, an ancient musical instrument; though applied sometimes to several musical instruments of different kinds, such as a lyre, a dulcimer, a triangular harp or trigon and the large Asiatic and Egyptian harps.

SAMBUR, a large deer (*Cervus unicolor*), widely distributed throughout southeastern Asia, and especially the hill country of India and the species of most importance to the sportsman. Large bucks approach five feet in height at the withers, and may exceed 500 pounds in weight. The antlers are large and rough, have the brow-tine sprouting at an acute angle with the beam instead of at or near a right angle, and dividing into two subequal tines at the extremity; the beam sometimes exceeds 40 inches in length in fine specimens from the Bay of Bengal. The color is properly a uniform deep brown, but paler and less handsome hues are often seen; the hair is long and wiry, and forms an erectile mane on the necks of full-grown stags. This deer is an inhabitant of the woodlands, coming out to graze on the hill-slopes, at times, for like the wapiti it subsists mainly upon grass and herbage, but never far from a refuge in the jungle; yet at certain seasons browses the new twigs, or seeks for fruits. There is great variety in their circumstances and habits throughout the wide area of the distribution of this species, and consequently a puzzling amount of variation in their form and appearance, so that several separate species have been without good reason, as further study has shown. Consult Blanford, 'Mammals of India' (1888); Lydekker, 'Deer of All Lands' (1898).

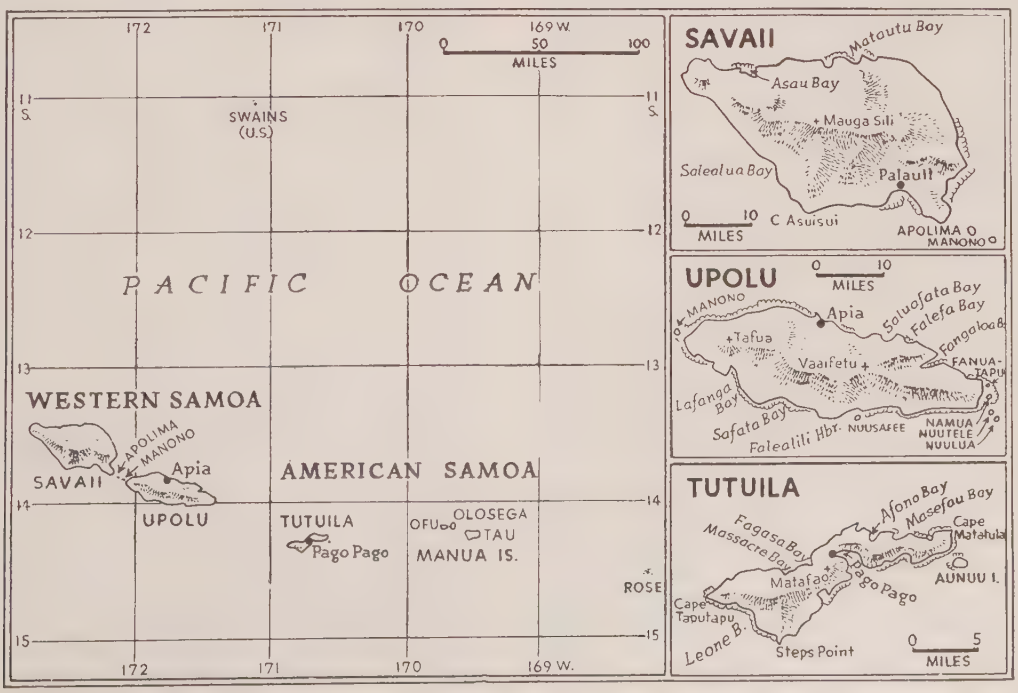
SAMIAN WARE. See ARRETINE WARE.

SAMNITES, an ancient people sprung from the Sabines and inhabiting the province of Samnium, in lower Italy. They were divided into four nations: the Caraceni in the north, capital, Aufidena; the Pentri in the center, capital, Bovianum, who constituted the most powerful nation of the Samnite stock; the Caudini in the southwest; the Hirfrini in the south, capital, Beneventum. The Samnites are described in Roman history as a people fond of war and of liberty, who were brought completely under the Roman yoke after long and bloody wars which continued, with few interruptions, 53 years. After the most fatal defeats, and the entire devastation of their country, the Samnites, together with the other nations which had assisted them, found themselves obliged to submit to the supremacy of Rome, 290 B.C. When the Italian allies of Rome revolted against her in the year 90 B.C., the Samnites once more rose against their oppressors, and fought with desperation. But Sulla entirely subdued them, and commanded that every Samnite should be put to death. Three days after the battle he ordered 4,000 of them who had been taken prisoners to be put to death on the Campus Martius. The few that remained, lived from that time scattered in villages. The Samnites cultivated various arts and manufactures, for the proximity of the refined Greeks in lower Italy had a very beneficial influence upon them. Even their laws and constitution were borrowed in a great degree from the Greeks. Their form of government was democratic. At the commencement of a war they were accustomed to choose a common general.

SAMOAN ISLANDS, an archipelago in the South Pacific about 2,700 miles east of the northern tip of Australia and 2,200 miles south of the Hawaiian Islands. The group, extending over a distance of 350 miles, comprises 14 islands having an aggregate area of 1,209 square miles and a population of 102,033. All of the islands east of longitude 171°W., together with Swains Island (q.v.), constitute American Samoa, which has an area of 75.3 square miles and a population (1950) of 18,937; west of that longitude is Western Samoa (formerly German and administered by New Zealand after World War I), 1,133 square miles in area and having a population (1951) of 83,096. American Samoa comprises (in addition to Swains Island) Tutuila (52 square miles); the Manua group, consisting of the islands of Tau, Olosega, and Ofu; Aunuu, administered as part of the Eastern District of Tutuila; and Rose, an uninhabited coral atoll. Western Samoa consists of the two large islands of Upolu (430 square miles) and Savaii (703 square miles); the small islands of Manono and Apolima; and the islets of Fanuatapu, Namua, Nuutele, Nuulua, and Nuusafee.

Physical Features.—All the Samoan Islands are peaks of a submarine chain of volcanic mountains. Barrier reefs encircle the large islands more or less, and especially Upolu. Brown and bare in many places at low water, the reefs are submerged at high tide, when the surf bursts upon them in miles of snowy whiteness. Between the outer reef and the shore stretches a lagoon of multitinted waters, varying in width from 200 yards to two and three miles; this generally smooth belt of water is, in effect, a canal encircling the islands, and is the highway along which most intercourse is had between different points of the islands. Lofty mountains rise in the interior, leaving broad stretches of comparatively level land bordering the shore and reaching up to low-lying foothills. In many places the sides of the mountains are not far from perpendicular yet, such is the climate, they are held in place by the network of growth that covers them. Over the surface of the islands is spread a tropical forest of often giant trees.

Savaii, the most westerly of the Samoan Islands, is much the largest and most rugged; it has a length of 47 miles and a maximum breadth



of 27 miles. The interior is occupied wholly by mountains, Mount Mauga Sili, the highest peak, rising to 6,094 feet. All the large villages, numbering about 30, are found along the edge of the shores.

Ten miles east of Savaii is Upolu, in many respects the most attractive island of the archipelago; it is 46 miles long and 16 miles in breadth. The highest of the island's numerous peaks is Mount Vaaifetu, 3,608 feet; Mount Tafua, 2,195 feet in height, is an extinct volcano at the western end of Upolu. On the seacoast nine miles northwest of Vaaifetu is the town of Apia, capital of Western Samoa and the territory's port. The harbor, however, is small and poorly sheltered from the northerly gales which occur during the hurricane season (January to March). On March 16, 1889, warships of Germany, the United States, and Great Britain, at that period with competing interests in Samoa (see *History*), were struck by a hurricane at Apia which cost the lives of 92 German and 54 American seamen and the loss of several vessels. The disaster was described in *A Footnote to History* (1892) by Robert Louis Stevenson (q.v.), who established a home at Vailima, near Apia, in 1890.

Apolima is a small island midway between Upolu and Savaii, and within the sea reef at the western end of Upolu lies the island of Manono, little more than a barren rock, which has played a great part in the history of the group. It has been the cradle of a feudal aristocracy and the focus of native politics, its chiefs holding a commanding influence in all Samoan affairs.

About 40 miles off the eastern coast of Upolu is Tutuila, largest island of American Samoa, about 25 miles long and 5 to 6 miles wide in the widest part. A mountain range extends nearly the whole length of the island, with spurs on either side and indentations of deep valleys. Near the center of the island is Mount Matafao, 2,141 feet; other peaks include Mount Piua, 1,700 feet, and Mount Alava, 1,600 feet in height. Except at the foot of the mountains along the coast, and a broad, fertile plain in the southwestern part of the island, there is little level land. Pago Pago Bay, the safest and best harbor in the South Pacific, has its entrance to the southward and nearly cuts the island in two; on the southern shore of a western arm of the harbor, about a mile from the open sea, stands the United States Naval Station, from which American Samoa was administered by a naval governor until 1951.

The island of Aunuu, about 300 acres in extent, lies about a mile off the southeastern shore of Tutuila, and 65 miles due east of Tutuila is the Manua group, the three islands aggregating 22 square miles in area. Tau (17 square miles), rises to two peaks in the center of the island—Lata, 3,056 feet, and Olomatimu, 2,961 feet; and 6.5 miles northwest of Tau are the little islands of Olosega and Ofu (together, 5 square miles), separated by a narrow strait and which reach the heights, respectively, of 2,095 and 1,587 feet. Rose Island is 70 miles east of Tau.

The climate of the Samoan Islands is tropical but equable. Strong southeast winds blow from May to November, and during the other months the winds are variable; moderate gales and occasional hurricanes have been experienced. The rainy season extends from December to March, the average yearly rainfall being about 193 inches. The temperature is highest during the summer months (December–February) and coolest in the winter months (June–August); the yearly temperature ranges from 90° to 70°F.

The People.—The Samoans are Polynesians (q.v.), of splendid physique, handsome, vigorous, and of tremendous strength. Never having been subject to the inroads of alien races and the consequent admixture of blood and speech, the people have preserved uncorrupted and unchanged many of their original racial characteristics. The Samoan language is probably the oldest form of Polynesian speech extant; it is closely related to the Maori, Tahitian, Hawaiian, and Tongan languages. The social organization is based upon the clan, and the chiefs, who are elected, have great authority. The most striking feature of every village is the *faletele,* a house where the native council meets, which is often of considerable size. Originally polytheistic, the Samoans are now Christians, Protestant and Roman Catholic missionaries having worked long among them. All mission bodies maintain schools, these supplementing the school systems operated by the two governments in the islands.

American Samoa.—American Samoa is classified as an unincorporated United States possession. After 51 years under naval administration it was, on July 1, 1951, placed under the jurisdiction of the secretary of the interior, who appoints the governor. The chiefs of Tutuila ceded that island and Aunuu to the United States on April 17, 1900, and the chiefs of the Manua group likewise ceded their islands on July 16, 1904; on March 4, 1925, by joint resolution of Congress, the United States annexed Swains Island (q.v.), which lies 210 miles north of the Samoan Islands, and this is administered as part of American Samoa. The inhabitants, citizens of American Samoa, are nationals only of the United States. Advisory to the governor is the Legislature, or Fono, of American Samoa which, as reorganized in 1952, comprises a 15-member House of Alii, or Senate (5 chiefs representing each of three districts) and an 18-member House of Representatives, which is elected by universal suffrage and secret ballot. For the purpose of local administration American Samoa is divided into three districts, each of which has a native governor responsible for welfare and good order; in each district, in turn, are county chiefs and village chiefs to whom responsibilities are delegated. Education is compulsory between the ages of 7 and 15. During 1953–1954, there were 55 public schools (52 elementary, with 4,909 pupils; 1 high, 144 pupils; 1 vocational, 46 pupils; and 1 teacher-training school, 11 pupils), and 6 private and parochial schools with 961 pupils. Appropriations in 1954–1955 for education totaled $256,500. Elementary teachers (Samoan) average $800 in salary annually; high school teachers (American), $4,000 and other benefits. The literacy rate is estimated at 94 per cent.

Western Samoa.—Formerly a possession of Germany, Western Samoa came under administration of New Zealand on Dec. 17, 1920, as a mandate of the League of Nations. The head of government is a high commissioner, appointed by the Dominion of New Zealand, who is also responsible for the Tokelau (or Union) Islands (q.v.), a small group north of the Samoan Islands. He is assisted by a Council of State consisting of two Samoan *fautua* (leading chiefs) and by a 25-member Legislative Assembly (the 2 *fautua,* 12 elected Samoans, 5 elected Europeans, 6 officials). Schools in 1952 numbered 477, including 113 gov-

ernment schools (13,158 pupils) and 364 denominational mission schools (19,636 pupils). Samoa College (primary and secondary departments) was opened at Apia in 1952.

Production and Transportation.—The soil of the Samoan Islands is extremely fertile. The natives cultivate the yam and taro as foodstuffs, and the breadfruit, pineapples, oranges, bananas, and other tropical fruits do well; many of the men are expert fishermen. The natural resources of American Samoa are of no economic importance, but the natives (there are few white planters) cultivate coconuts on a considerable scale from which they make copra; this product, and mats woven from local grass and leaves, are the chief exports. Western Samoa has several crops of economic value. Cocoa, coconuts, and rubber have been cultivated since the time of the German possession of the territory, and bananas later became an important item of export. While most of the cultivable area of about one million acres consists of inalienable native lands, white planters own 20,000 acres and more is available on lease. Roads total 70 miles in American Samoa and 260 miles in Western Samoa. There are steamship and air connections between the Samoan Islands and the west coast of the United States, Australia, New Zealand, Fiji, and Tahiti.

History.—The Samoan Islands were discovered about 1722 by Jakob Roggeveen, the Dutch admiral, who did not land but named some of them, possibly the Manua group, the Baaumann Islands. In 1768 Samoa was visted by the French nagivator Louis Antoine de Bougainville, who gave the archipelago the name of Navigators' Islands, and during 1787 Comte de La Pérouse (Jean François de Galaup) spent several weeks in and around the islands; 11 of the latter's crew who landed on Tutuila for water were killed by the natives. The British warship *Pandora* touched at Samoa in 1790, and in 1824 the islands were visited by Otto von Kotzebue, the Russian navigator. In 1830, John Williams of the London Missionary Society arrived, and in 1835 a Wesleyan mission station was established on Manono. Roman Catholic missionaries settled on Savaii in 1845, and before the close of the 19th century Christianity had been accepted by all Samoans.

Meanwhile, however, the political history of the islands was most turbulent. An agreement was made in 1838 between native chiefs and the commander of the British warship *Conway* permitting foreign vessels to use Samoan ports on payment of dues, and in 1839 a United States expedition under Charles Wilkes undertook the first thorough survey of the archipelago; Wilkes also raised the American flag at the harbor of Pago Pago, but the intended annexation was not confirmed by Congress. At about this period numerous white men—mostly Americans, British, and Germans—settled on the islands and took Samoan wives, and it was not long before Apia, on Upolu, became the headquarters of white settlement. German traders and planters became very active in the most westerly of the islands, and because of the commercial interests involved, consuls were appointed at Apia by Great Britain in 1847, by the United States (which employed the term Commercial Agent) in 1856, and by Germany in 1861. From this time the chiefs ruled only under the direction of the three consuls, but the former soon fell to fighting one another and the latter, motivated largely by commercial rivalries, became mutually suspicious and jealous. Peace was made between the rival native rulers in 1873, a house of nobles and a house of representatives being established at Apia, and Malietoa Laupepa and the chief of the royal house of Tupea becoming joint kings. In 1880, Malietoa was recognized as king by the three powers, but in 1887 was deposed by the Germans on the charge of unjust treatment of German nationals and was deported from New Guinea, being transferred first to the Cameroons, in West Africa, and then to Hamburg. In spite of the protests of the American and British consuls, Tamasese was proclaimed king by the Germans, but he was succeeded in 1888 by Mataafa, near relative of Malietoa, who had defeated Tamasese in battle.

Meanwhile, when the United States warship *Narragansett* visited Pago Pago in 1872 the senior chief of Tutuila sought vainly to place the island under American protection, and in 1877 a party of leading Samoans went to Fiji to request British protection for the entire archipelago. When this was denied the natives made a like fruitless visit to Washington, D.C., but there made an agreement in 1878 with Secretary of State William Maxwell Evarts ceding Pago Pago as a coaling and naval station and granting commercial and extraterritorial rights to the United States. In 1879 Germany made a similar treaty with the Samoans, obtaining practical control of the harbor of Saluafata, near Apia, and exceptional power in the adjustment of affairs between German nationals and natives; and the same year Great Britain also secured a naval station and other privileges. But these concessions appeared merely to increase the friction in Samoa, and tension grew so great that American, German, and British warships were anchored at Apia in 1889 to give support to their respective consuls. As noted above, a fierce hurricane in March wrecked several of the vessels, and the differences between the powers resulted in a conference at Berlin where, on June 14, 1889, a tripartite treaty was concluded. The Samoan Islands became neutral territory with an independent government and Malietoa was called from exile and made king, the authority of the consuls being restricted to the municipality of Apia and the island of Upolu, and an extraterritorial court, presided over by an American judge, had jurisdiction in matters affecting foreigners. A commission, appointed to investigate titles to land alleged to have been purchased from the natives, finished its work in 1894, and confirmed 75,000 acres of land to Germans, 36,000 to British, and 21,000 to Americans. Samoa did not, however, remain independent for many years. Continued rivalry between native chiefs led to large-scale fighting in 1898, and as a result Germany, the United States, and Great Britain annulled the next year the Berlin Treaty of 1889. By an agreement signed on Dec. 2, 1899, the Samoan Islands were divided among the three powers and the kingship abolished, but Britain withdrew all claims to a share in the territory in exchange for surrender by Germany of rights in Tonga, certain of the Solomon Islands, and Niue. Under the agreement, the United States retained Tutuila and all other islands of the Samoan group east of longitude 171° west of Greenwich, while Germany obtained all the Samoan territory to the west of the American holdings. King Oscar II of Norway and Sweden was made arbitrator to determine and adjudge the amount of claims due to citizens of the British, German, and American governments having pos-

sessions on the islands and affected by recent military operations there. American Samoa was placed in charge of a naval governor, and German Samoa became a colony administered by an imperial governor and a native chief assisted by an advisory council.

German Samoa was defenseless when World War I broke out in 1914. A New Zealand expeditionary force, escorted by an Australian squadron, arrived off Apia on August 29, and the colony was surrendered the next day. Military occupation of the country continued until 1920, when New Zealand was named mandatory power to govern Western Samoa and thereupon created a civil administration. The history of Western Samoa during the next 15 years was a record of almost unceasing political disputes, the natives bitterly resenting the fact that they were accorded virtually no share in local government. Many of the white people living in the mandate supported the efforts of the Mau, a nationalistic organization, to participate in public affairs, but it was not until 1936 that the government of New Zealand permitted that body to do so. During World War II, the Samoan Islands were free from enemy attack; from 1942 until the end of the conflict, the United States operated a large air base on Upolu, the principal island of Western Samoa, and made extensive use of American Samoa, particularly the excellent harbor of Pago Pago.

On Nov. 11, 1946, the New Zealand government issued proposals for transforming its League of Nations mandate for Western Samoa into a United Nations trusteeship. The plan was approved by the United Nations General Assembly on December 13, and the trusteeship became effective on Jan. 25, 1947. Early in 1947, the United Nations Trusteeship Council received a petition by leading chiefs of Western Samoa requesting self-government and asking that the Western and American Samoas be rejoined. The New Zealand government, through which the petition had been forwarded, supported the plea for self-government. In April 1947 the council sent a mission to Western Samoa to study the merits of the petition for self-government, but the council was unable to act on the request that the archipelago be reunited, because the United States had submitted no trusteeship agreement covering American Samoa. The commission's report, endorsed by the council on Dec. 5, 1947, called for establishment of a "Government of Western Samoa," with the high commissioner representing New Zealand to be assisted by a Council of State containing Samoans, and a Legislative Assembly having a Samoan majority. The Council of State was created in 1947, and the Assembly was inaugurated at Apia in May 1948. A convention was called for late 1954 to discuss proposed constitutional changes and define the relationship between New Zealand and a future self-governing state of Western Samoa. Meanwhile, jurisdiction of American Samoa had been transferred on July 1, 1951, from the Navy Department to the Department of the Interior.

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SAMOS, sā'mŏs, an island in the Aegean Sea, one of the Sporades, 45 miles southwest of Izmir (Smyrna); it is separated from the Turkish mainland by a strait only one mile in width. It has an area of some 180 square miles, and the population numbers 71,000 (est. 1946). There are several good harbors on the coast, and the island is traversed by two rocky and barren mountain ranges, the highest peak of which is Mount Kerkis (4,725 feet), relieved by forests of pines. Olive groves are plentiful on the lower slopes of the mountains. Vathy, on the northern side of the island, is the capital and chief port. On the south side lies Khora, the former capital, which stands on the site of the famous temple of Hera. Samos was the birthplace of Pythagoras (q.v.). Colonized by the Ionians about 1000 B.C., the island passed to the Persians in the 6th century but regained its freedom after the victory of Mycale, 479 B.C. The Romans captured Samos in 84 B.C. In 1832 it passed under Turkish suzerainty but enjoyed considerable autonomy under a Greek governor and legislature. It was seized by the government of Greece in 1912, and that country's sovereignty was confirmed in 1923 by the Treaty of Lausanne.

SAMOSATA, sā-mŏs'ā-ta, a ruined city of ancient Syria, located on the right bank of the Euphrates. On its site is the modern Turkish village of Samsat, east of Maras and northwest of Urfa. Occupied in early history by the Hittites, Samosata was absorbed into the Assyrian Empire in 708 B.C.; and it became capital of Commagene when that district obtained its independence. In 72 A.D. it became subject to Rome. It was the birthplace of Lucian (q.v.), the Greek satirist and wit and of the heretic Paul of Samosata (q.v.). The majority of the inhabitants of Samsat are Kurds, their predecessors having been Armenians.

SAMOSATIANS or **PAULIANISTS.** See PAUL OF SAMOSATA.

SAMOTHRACE, săm'ō-thrās, or **SAMOTHRAKE,** an island of the Aegean Sea, about 40 miles northwest of the entrance to the Dardanelles, and nearly opposite the mouth of the Maritsa (ancient Hebrus), 36 miles from the coast of Thrace. It is rugged and mountainous and of almost oval form; its highest summit, Saoce, reaches an elevation of 5,248 feet. On the northern coast are sulphur springs of considerable renown. The principal products are grain, wood, oil, honey, and wax, and on the coast there is a considerable sponge fishery. In the northern part of the islands the ruins of ancient Samothrace were found (1873–1875), consisting of Cyclopean walls; a Doric temple of marble and another of circular form. Samothrace was of importance from early times and is frequently mentioned in the works of Pliny, Homer, and others. Here Poseidon witnessed the contests between Greeks and Trojans on the plains of Troy. But its chief renown was due to its having been the seat of worship of the Cabiri (Cabeiri, q.v.), and to its religious mysteries, supposedly derived from the Pelasgians. The island is once mentioned in history in connection with the expedition of Xerxes, one of its ships having taken a conspicuous part in the famous battle of Salamis. The island was first colonized by Phoenicians, afterward joined by Greeks. It always en-

joyed autonomy, partly owing to its sacred character, partly to its lack of political importance — due to the fact of its having no good harbor. Saint Paul visited the island in the course of his second missionary expedition (Acts xvi, 11). The inhabitants are mostly Christians. Pop. 3,500. Samothrace, with all the other Ægean Islands, was in the possession of Greece and Italy in 1918, and by the Treaty of Lausanne, 1923, was awarded to Greece.

SAMOVAR ("self-boiler"), a Russian table kettle in which the water (for tea, etc.) is kept boiling by glowing charcoal in a vertical iron tube through the centre.

SAMOYEDES, săm'oi-dēz, or **SAMOIEDES,** a Mongolian people inhabiting the shores of the Arctic Ocean, from the Kanin Peninsula, on the eastern shores of the White Sea, in European Russia, to the Gulf of Khatanga, in the northeast of the government of Yeniseisk, Siberia. They consist of three principal tribes, speaking different dialects. Their origin is unknown, but they are supposed to have come from more southern regions, and have been erroneously confounded by the Russians with the Laplanders, whose country, called in the Lapland tongue, Sameanda has probably given them their name. They are nomadic and live chiefly by fishing, hunting and keeping reindeer. Their principal wealth consists in herds of reindeer, which supply them with food, clothing, tents, utensils, etc. They are of small stature, usually between four and five feet; have a flat, round and broad face, thick lips, wide nose, little beard, black hair, in small quantity. They are extremely superstitious and generally peaceable. They are unacquainted with the art of writing, their traditions being imperfectly preserved only in their songs. When Russian expansionists first became acquainted with them they had already been driven from their native seats by the Tatars, and separated from their kindred tribes.

SAMP, originally an Indian article of food consisting of maize, broken or bruised, which is cooked by boiling and eaten with milk.

SAMPAN, a boat of various build used on the Chinese rivers, in Straits Settlements and elsewhere, for the conveyance of merchandise, and also frequently for habitation. They are swift sailers both with oar and sail.

SAMPHIRE, an umbelliferous plant (*Crithmum maritimum*), pale-green with bi-triternate leaves and fleshy very succulent leaflets, and umbels of small yellowish flowers followed by fennel-like fruits. It grows wild along the rocky shores of northwestern Europe, near the water, and when abundant, is used as a pickle, salad or potherb. It can also be cultivated in gardens, if not too far from the coast, and if supplied with plenty of sait and soda solutions. The name is a corruption of the old French "herbe de Sainte Pierre," and it is also called in England Saint Peter's-wort.

SAMPLE, Robert Fleming, American Presbyterian clergyman: b. Corning, N. Y., 19 Oct. 1829; d. New York City, 12 Aug. 1905. He was graduated from Jefferson College in 1849. From 1853 he was engaged in various pastorates in Pennsylvania and Missouri until 1887 when he assumed charge of the Westminster Presbyterian Church, New York, where he remained and was pastor emeritus from 1902 till his death. He was professor of Christian ethics in Lincoln University, was editor of 'North and West' in 1895–1902, traveled widely in Europe and Palestine, and was connected with numerous religious educational and religious organizations. He published 'Early Dawn' (1861) 'Memoir of Rev. John C. Thorn' (1868); 'Beacon Lights of Reformation' (1889); 'Elements of Pulpit Power' (1901), etc.

SAMPLERS. A strip, or square of linen, or canvas, recording specimen stitches and patterns, was, for hundreds of years, worked by every young girl of aristocratic and well-to-do families. The sampler had the double value of giving the child skill as she worked it and of serving as a guide and source of reference all the rest of her life. The sampler ceased to become a part of education in the middle of the 19th century. After 50 years of oblivion, it came into prominence in a new way, to enjoy fame by appealing to the fancy of the collector. The first and finest collection was made by the late A. W. Drake and is now scattered. A splendid collection is in the South Kensington Museum, London. Although no earlier examples exist than the 17th century, the sampler, which is nothing more nor less than a pattern-book for the embroiderer, is probably as old as the art of embroidery (q.v.) itself.

The embroiderer was seldom the designer of the decoration that grew beneath her needle. The sampler was, therefore, a kind of notebook (corresponding to the artist's sketch-book), exhibiting various stitches and suggestions for embroidery, or for making cross-stitch letters, numbers, patterns, etc. It was, consequently, of both artistic and practical value. The name tells plainly what it is.

Chaucer uses the word *ensampler* as a synonym for pattern, and the poet Skelton (1469–1529) speaks of "the sampler to sew on, the lacis to embraid." The inventory of Edward VI (1552), mentions "a sampler, or set of patterns, worked in Normandy in green and black silks." Shakespeare mentions it twice — in 'A Midsummer Night's Dream,' when Helena reminds Hermia that they worked together on a sampler, and in 'Titus Andronicus' in reference to the Greek story of Philomela. From the 16th century samplers are constantly met with in records and diaries and even in wills, for they were deemed worthy of special bequest. Samplers of the 16th and 17th centuries often contained insertions of reticella or cutwork (see LACE), drawn-work and patterns for needle-point lace; for although pattern-books of lace were published, they were hard to procure and the supply was limited.

The evolution of the sampler is as follows: First, the sampler consisted of decorative pictures thrown here and there upon the surface of a piece of canvas; then came designs placed in orderly rows and making in themselves a harmonious whole; next, alphabets and numerals chiefly for the use of these who marked the linen; and next, imitation of tapestry pictures by the addition of figures, houses, birds, animals and flowers. Last of all the sampler was adopted as an educational task in a dame's school as a specimen of a pupil's phenomenal achievement at an early age.

The sampler was used in all European countries; and beautiful specimens of Spanish, French, Italian, Dutch and German work exist. To us the English examples are the most interesting because the American samplers are English in character of workmanship and design.

The earliest of all known samplers is in this country. It is owned by the Essex Institute in Salem, Mass., and was worked by Ann Gower, the first wife of Governor Endicott. She came to Salem in 1628 and died in 1629. The sampler was, of course, worked in her girlhood in England. The upper part consists of the alphabet and the lower contains examples of needle-work. Another early sampler, worked by Loara Standish, daughter of Captain Miles Standish, is preserved in Pilgrim Hall, Plymouth, Mass.

The age of a sampler is told by the character of the designs and lettering, coloring, border and insertions. The earliest samplers are long and narrow. A conventional strawberry and oak leaf, or acorn, appears in almost every 17th century sampler. The rose is very frequent, but is not so much used as the "Persian pink," or carnation.

The curious human figures with outstretched arms, known as "Boxers," appear between 1648 and 1742. When they disappear, their place is taken by Adam and Eve in the garden of Eden. During the early part of the 18th century the sampler consisted exclusively of long sentences worked in silks of every imaginable hue. A peculiar mustard-colored linen was introduced as groundwork for the stitches after 1700. Toward the middle of the century blues, greens, yellows and blacks were the prevailing colors for the silks. The stag, which had appeared but rarely before 1700, now became the fashion and continued to be worked as long as samplers were made. About 1728 the border encircled the whole sampler; and it is noticeable that as the variety of patterns decreased the sampler became shorter. From 1740 onward the border always appears and the sampler is a picture instead of a pattern-sheet. Next, the border develops into a wreath of naturalistic flowers. A few dates of decorations will aid the curious in determining the period of any sampler. Alphabets, name of the maker, rows of ornaments, stag (occasionally), and Boxers date from 1648; numerals, 1655; inscriptions, 1662; crown, 1691; motto or text, 1686; verse, 1696; Adam and Eve, 1709; border, 1726; floral border, 1730; fleur-de-lis, 1742; flower in vase, 1742; heart, 1751; stag (commonly used), 1758; house, 1765; mustard-colored canvas, 1728; Spies to Canaan, 1804; crewels replace silk, 1820.

The inscriptions consist of moral sayings, allusions to death and its terrors, hymns, melancholy and lugubrious verses and quotations from the Bible. Sometimes an entire Psalm was worked in letters as clear and neat as those of a printer. The plodding needle also took for its task the Lord's Prayer, or the Ten Commendments. Sometimes, too, the sampler was worked with the names and dates of birth and death of an entire family, proving once again that needlework occasionally fulfilled its ancient purpose of recording events. See EMBROIDERY.

In the 18th century maps were worked on samplers in the dame's schools for the double purpose of teaching geography and needlework. Many of these survive. Darning samplers were made in the 19th century. These show various kinds of darning stitches suitable for mending certain textiles, and are arranged in circles and squares around a basket, or a vase of flowers. Consult Huish, Marcus B., 'Samplers and Tapestry Embroideries' (London 1900); Jourdain, M. A., 'English Secular Embroidery' (London 1910); Earle, Alice Morse, 'Home Life in Colonial Days' (New York 1898), and 'Child Life in Colonial Days' (New York 1899); *Century Magazine* (1912).

SAMPSON, Archibald J., American diplomat and author: b. near Cadiz, Ohio, 21 June 1839. He was graduated from Mount Union College, Ohio, in 1861 and from the Cleveland Law School in 1865; served through the Civil War in the Union army, starting as private and attaining the rank of captain; was admitted to the bar in 1865 and settled in Sedalia, Mo., where he engaged in the practice of law. There he was successively city, county and district attorney. He removed to Colorado in 1873, locating in Canyon City and establishing his law practice. There he was again county attorney and in 1876 was elected attorney-general of the State. In 1889 President Harrison appointed him American consul at Paso del Norte, Mexico. On leaving there he located in Phoenix, Ariz. In 1897 President McKinley appointed him Envoy and Minister of the United States to the republic of Ecuador, where he remained until 1907, being the first person for over 60 years living in a territory to receive a diplomatic appointment. After his return to the United States he spent a good part of his time lecturing on "Masonry as seen in Foreign Lands," and other subjects. Mr. Sampson was past department commander, Arizona Department of the G. A. R. He died 24 Dec. 1921.

SAMPSON, Deborah, American heroine: b. Plymouth, Mass., 17 Dec. 1760; d. Sharon, Mass., 29 April 1827. She served in the Continental army for three years during the Revolutionary War, disguised as a man and bearing the name of Robert Shurtleff. She gained a reputation for coolness and courage in action and was engaged in many daring enterprises. She was wounded by a sabre cut on the temple in a skirmish near Tarrytown and later was shot through the shoulder. During the Yorktown campaign she was seized with brain fever and her sex was discovered. She was discharged by Washington, receiving from him a note and a purse of money and later was invited to the capital, where Congress voted her a pension and a grant of lands. She published her experiences under the title 'The Female Review' (1797; new ed. with introduction and notes by Rev. John A. Vinton, 1866).

SAMPSON, William Thomas, American naval officer: b. Palmyra, N. Y., 9 Feb. 1840; d. Washington, D. C., 6 May 1902. In 1860 he was graduated from the United States Naval Academy, where he had been the highest officer of the cadet battalion. His first assignment was on board the frigate *Potomac*. He was promoted lieutenant, 16 July 1862 and two years later became executive officer on the ironclad *Patapsco* of the South Atlantic blockading squadron. He held the watch, 15 Jan. 1865, on the turret roof of the *Patapsco* when that vessel was blown up and sunk by a torpedo in Charleston Harbor. Only his own coolness

saved his life in that catastrophe. He became lieutenant-commander in 1866 and commander in 1874. In the autumn of the last-named year he was detailed for the third time as instructor at the Naval Academy and remained there four years in charge of the department of physics. Later he became assistant superintendent of the Naval Observatory, and in 1884 was a member of the International Prime-Meridian and Time Conference at Washington. He was superintendent of the torpedo station at Newport, 1885–86; representative to the International Marine Conference at Washington in 1886, and superintendent of the Naval Academy 1886–90, where he introduced great improvement in the state of training. In 1889 he was promoted captain and later put in command of the *San Francisco,* the first steel cruiser of the new navy. During his term as chief of the Bureau of Naval Ordnance, 1893–97, the use of smokeless powder was perfected by experiments conducted under his supervision. Upon quitting this post he was put in charge of the battleship *Iowa,* which had been placed in commission in June 1897, and with this ship he took his place as senior captain in the North Atlantic squadron. On 17 Feb. 1898, two days after the battleship *Maine* was blown up in Havana Harbor, he was appointed president of a board of inquiry directed to investigate the causes of that disaster. On 22 March the investigation was concluded and Captain Sampson, promoted to the rank of acting rear-admiral, succeeded Admiral Sicard in command of the North Atlantic squadron. Upon the declaration of war with Spain, 21 April, he was ordered with his fleet to blockade the northern coast of Cuba. A few days later the Navy Department was informed of a Spanish fleet under Admiral Cervera having sailed from the Cape Verde Islands toward Cuba. Admiral Sampson was forthwith ordered to intercept this fleet in its supposed progress to the relief of Havana. On 1 June he arrived off Santiago, where the Spanish fleet had meantime been located and at once effected a strict blockade. On 3 June, under his orders, an unsuccessful attempt was made by Naval Constructor R. P. Hobson and others to prevent egress of the Spanish fleet by sinking the *Merrimac* in the channel entrance to the harbor. On the morning of 3 July Sampson had withdrawn on the flagship *New York* and was proceeding to Siboney for a conference with General Shafter, the commander of the land forces, when it was discovered that the Spanish ships were leaving the harbor of Santiago. The *New York* was put about and, under full steam, overtook the blockading fleet already giving battle under the direction of Commodore Schley, commander of the flying squadron and second in command of the blockading fleet. The entire Spanish fleet was destroyed and Admiral Cervera was captured. After the close of the war a long and bitter newspaper discussion ensued over the question whether the chief honors of this victory belonged to Sampson or Schley. A court of inquiry which met three years later, at the request of Schley, decided against his claims, but the controversy prevented Congress from awarding any official recognition to Sampson for his success. For two years from October 1899 Admiral Sampson held command of the Boston Navy Yard. In October 1901 he was placed on waiting orders; his health was much impaired; he was retired from active service 9 Feb. 1902, and resided in Washington until his death.

SAMSHUI, China, a treaty port in the province of Kuang-tung, situated on the river West, about 100 miles west of Canton. The town is small, but favorably situated for foreign trade

SAMSON, one of the judges over Israel. He was of the tribe of Dan, and the circumstances attending his birth, heralded as it was by an angel, his consecration as a Nazarite, and those visitations of the Spirit of the Lord through which he was enabled to perform feats of heroic might, marked him out as a man raised up to meet a national emergency. The first recorded instance of the exercise of his great strength is in connection with his marriage to a daughter of the Philistines. At the wedding-feast Samson proposed a riddle to the guests, wagering 30 shirts and as many suits of clothes that they could not guess it in seven days. The secret of his riddle being betrayed to them by his wife, Samson went to Askalon, killed 30 Philistines and gave their clothes to his guests. His wife having, during his absence in his own country, married again, he caught 300 foxes and tying them together tail to tail, with a fire-brand between them, let them loose in the fields of the Philistines. His own countrymen bound and delivered him into the hands of his enemies, but he snapped the cords asunder and killed 1,000 Philistines with the jaw-bone of an ass. From this period Samson was judge of Israel for 20 years. While on a visit to Gaza the gates of the city were closed upon him by the Philistines, whose intention it was to kill him, but he rose and carried off the gates to a distance of 20 or 30 miles. Not long after he fell in love with Delilah, to whom he revealed the secret of his strength, and she by cutting off his hair deprived him of his powers and betrayed him to his enemies, who put out his eyes and set him to work in a mill with slaves. At a great festival in honor of Dagon Samson was brought out to furnish sport to the Philistines. But his hair had grown again, and his vigor having returned with it, he took vengeance on his enemies by pulling down over their heads the building in which they were assembled. Milton has made his death the subject of a drama — 'Samson Agonistes' (1671), Handel that of an oratorio, 'Samson' (1743) — and his exploits have been illustrated in the woodcuts of Dürer, and the paintings of Guido Reni, Rembrandt and Rubens.

SAMSON AGONISTES, a tragedy in blank verse and irregular meters, the final work of the English poet, John Milton, was published in 1671. In substance the drama is based on the story of Samson in Judges xiii–xvi; in form it follows rigorously the model of classical tragedy.

The action is limited to the final episode of Samson's life, his destruction of himself and great numbers of the Philistines by pulling down the pillars of their theatre, at a public festival to which he had been brought as a captive to entertain the populace. Preparation for the catastrophe is made by a series of events, comprised in a single day, which rouse Samson to make final use, for the glory of the

Hebrew God, of the power which had been entrusted to him and which through his own sin he had temporarily lost. A chorus of Hebrews reviews the events of Samson's life and interprets the changing emotions of the action.

The intensity of feeling which Milton has put into his picture of Samson is due to the analogy which he felt between the lot of his hero, a chosen champion of God, "blind amid enemies," and his own position in the alien society of the Restoration. Though lacking the poetic brilliancy and the variety of 'Paradise Lost,' 'Samson Agonistes,' by virtue of its moral and spiritual energy and its consummate art, makes a profound impression on the reader. More nearly than any other work in our literature it is the modern counterpart of The Book of Job. Consult the works on Milton listed under PARADISE LOST; also 'Samson Agonistes' (edited by Verity, A. W., 1892); and Jebb, R. C., 'Samson Agonistes and the Hellenic Drama.'

JAMES H. HANFORD.

SAMUEL, Hebrew judge and prophet about 1140 B.C., whose rule preceded the establishment of the kingly office. His name, in Hebrew "Shemuel," meaning "asked from," or "heard of God," is explained by his story as a child. He was the son of Elkanah, of Ramathaim-zophim, belonging to the tribe of Levi, by Hannah. Hannah had been barren previous to the birth of Samuel, but she prayed earnestly to the Lord for a man-child, and vowed that if her petition were granted she would consecrate the child to the Lord all his days. Her prayer being heard she took her son to Shiloh to surrender him to the high-priest to be trained to the service of the Lord. The boy grew up devoted to the temple service; but after the death of Eli nothing more is heard of Samuel for a space of about 20 years, while the Ark, restored by the Philistines, was in the house of Aminadab. He then exhorted the Israelites, when they were hard pressed by the Philistines, to abandon their idolatry, and to fear God and worship him, as their only means of deliverance. His prayers and sacrifices gained for them the victory at Mizpeh, and it is probable that from this time, and in consequence of the leading part Samuel then took, he obtained the name and authority of judge. It is recorded that he judged Israel all his life, going a yearly circuit from Ramah, where was his home, to Bethel, Gilgal and Mizpeh. At Ramah he built an altar to the Lord. His administration was distinguished by the restoration of the neglected worship of Jehovah. He also established schools of the prophets. In his old age the corruption of his sons, to whom he had transmitted the active duties of the office of judge, excited discontent among the Hebrews, who demanded a king. Samuel reluctantly yielded to this revolution, but at the same time anointed the king of the general choice. After the establishment of the monarchy Samuel still continued to be judge in matters affecting morals and religion, in addition to the exercise of his prophetic functions. In his bearing toward Saul Samuel conducted himself with wonderful dignity and kindliness. He earnestly desired that Saul, as king, should rule well in the fear of the Lord, and that his dynasty should be permanent. When Saul attacked the priestly office and privileges Samuel anointed a new king, David. He did not live to see the contest between David and Saul decided; but even after his death his spirit, evoked by the witch of Endor, threatened Saul with the divine vengeance. See SAMUEL, BOOKS OF.

SAMUEL, Books of. In the Hebrew Bible the two books of Samuel, like Kings, formed originally one book. The title is derived from the name of the prophet who appears as the principal character in the earlier part of the narrative and who played a most decisive part in the founding of the Hebrew monarchy.

The book seems to have been composed, in essentially its present form, shortly before the publication of the law of Deuteronomy in 621 B.C. After that event Samuel received some editorial revision and additions, but no such rigid framework, designed to teach the great lessons of Deuteronomy, as is seen in Judges and Kings. It thus belongs to the first great era of Hebrew historical writing, which began in the latter half of the 10th century B.C. and ended with the publication of Deuteronomy. The analysis of this book into its component documents has not been so satisfactorily worked out in detail as in the case of the narrative books of the Hexateuch, but there is no great difficulty in recognizing a general distinction between the older and younger elements, at least in the first part of the work. The earlier strand gives a vivid, natural account of the rise of the monarchy, with Samuel appearing as a local seer and leader of a religious-patriotic movement, eager to unite the Hebrew tribes in a struggle against their Philistine oppressors. In the later strand, Samuel figures as himself a recognized military leader and "Judge" of united Israel, who wins overwhelming victory in the struggle against Philistia and is at first opposed to the establishment of the kingship. The earlier picture shows the "king maker" as a really greater and nobler man than the later represents. From a relatively obscure position, with keen vision he recognizes in the unawakened giant who comes to consult him the possibilities of a king who shall unite and free the tribes, and he very skilfully sets in operation influences that make Saul's own action sure. In the later tradition, which took shape in Samuel's own tribe, the figure of the prophet has grown into that of one who holds a position of recognized leadership and authority, but it is no longer one who sees the real need of the time. Many scholars connect the earlier strand with the great Judean history that appears throughout the Hexateuch, and the later with the similar Ephraimite history. It seems more probable, however, that the later strand was written after the composition of the Ephraimite history, while the early stories of Samuel and Saul were composed before the Judean history of the Hexateuch. In the latter part of 1 Samuel and in 2 Samuel we do not have so clearly an inweaving of an earlier and later document, but it is possible to distinguish, to some extent, the younger and older elements. Recognition of the composite origin of the book relieves the obvious difficulty of the duplicate narratives that puzzle any attentive reader — the two introductions of David to Saul, the two origins of the saying con-

cerning Saul among the prophets, the two accounts of sparing Saul's life, etc. The analysis also brings into clear relief as a separate document the wonderful, dramatic story which, with some later elements, constitutes chaps. ix to xx of 2 Samuel.

The book as a whole attained substantially its present form earlier than any other of the historical books of Israel. In its completed form, it falls into five principal sections, due in part to the plan of the compiler and in part to the form in which the materials came to him: (1) Samuel and the establishment of the kingdom under Saul (1 Samuel i–xiv); (2) Saul and the rise of David (1 Samuel xv–xxxi); (3) the establishment of David as king (2 Samuel i–viii); (4) court and family life of David (2 Samuel ix–xx); (5) Appendix (2 Samuel xxi–xxiv). Some would treat (2) and (3) as one section — the summaries of the reigns of Saul and David introduced into 1 Samuel xiv and 2 Samuel viii would favor such division. In the opening chapters of the book the scenes lie in the days of the Judges, when the tribes of Israel are without political union or any common organization. The birth and boyhood of Samuel are recounted. The defeat of Israel by the Philistines with the capture, vicissitudes, and restoration of the Ark precede Samuel's judgeship and victory in battle against the Philistines. The circumstances leading to Saul's selection as king and his early victories are followed by the summary of his wars and a notice of his family. The second section opens with the rejection of Saul and the introduction of David to the history. It is occupied chiefly with Saul's growing jealousy and David's flight and outlaw life. Saul's last battle against the Philistines closes this section. The third division gives David's elegy over Saul and Jonathan, taken from a collection of national songs known as the Book of Jashar. The narrative goes on to record the steps by which David becomes king over all Israel, with the Philistines subdued and the Hebrew capital established at Jerusalem. The summary of David's victories and his court officers closes this section. The following division (2 Samuel ix–xx) tells the story of the birth of Solomon and the troubles in David's family that resulted in the deaths of older brothers, making room for Solomon's ascent to the throne. The conclusion of this dramatic narrative is not given in the book of Samuel, but forms the introduction of the book of Kings. The appendix contains two songs ascribed to David, one of which occurs also as the 18th Psalm, lists of David's heroes, and two very primitive stories of a famine and pestilence that occurred during his reign. Samuel thus contains a history of the transformation of a group of tribes into an organized state, commanding the respect of neighboring kingdoms and able to weather the storms of rebellion and civil war.

Viewing the book as literature, the early narrative of Saul's selection, beginning with chap. ix, the stories of his jealous struggle against the rising prestige of David, and the complex story of David's court and family life are to be noted as the earliest examples of connected prose in ancient Israel. As such they constitute the beginnings of genuine historical literature in the writings of the world. From these vivid narratives, committed to writing soon after the events had occurred, the writers of Judah and Israel later went on to compose the story of the earlier past. In power to select the significant points that make character and event living and intelligible, these early narratives are unexcelled in prose literature. The religious and moral conditions recorded show many primitive traits, yet the narratives are characterized by a devotion to the God of justice, who cares for right conduct among men, that makes them perennial sources of moral and religious inspiration.

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SAMURAI, the feudal warriors of Japan, who, prior to the revolution of 1867–68, comprised about one sixteenth of the population (see JAPAN) and are now represented by the *shizoku,* or knights. They were distinguished by indomitable courage, their marvelous feats of arms, fervent patriotism, intense loyalty and a strong antipathy to foreigners, which was in marked contrast to the hospitable and courteous demeanor of the mass of the population. They were the military retainers of some 276 daimios or feudal chieftains, the more powerful among whom were those of the southern clans Satsuma, Choshiu, Tosa and Hizen. After the reopening of foreign relations due to United States initiative in 1854, the enlightened Japanese discovered at once that to place themselves commercially and politically on a level with the progressive nations of the world they had to adopt Occidental methods and the prominent chiefs and their samurai were the first to advocate the suppression of the Tokugawa shogun, the supremacy of the mikado, the surrender of feudal powers, and a reorganized administration for the building up of a constitutional monarchy, most of which was effected by the revolution of 1868.

The samurai expected that the military and naval services would be exclusively reserved for them and their descendants. The radical measures adopted in 1871, however, led to the total abolition of feudalism and the absorption of the samurai into the mass of the people, in many cases with a praiseworthy self-abnegation, but in others not without serious opposition. That of the famous Saigo of Satsuma, hitherto one of the most prominent reformers, culminated in the civil war of 1877 and the total defeat of the samurai and their pretensions. See JAPAN.

SAMVAT, a method of reckoning time in India, generally used except in Bengal. Chris-

tian dates are reduced to Samvat by adding 57 to the Christian year.

SAN ANDREAS, săn' ăn-drā'ăs, **RIFT,** a zone of faults in the earth's crust extending along the coast of California. The northern extremity of the rift is in Humboldt County near Cape Mendocino. For a distance of about 75 miles to the coast a few miles north of Cape Arena the rift is offshore; thence it continues on land, passes through the San Francisco peninsula, and curves off to the southeast into the desert region of southern California. The total length of the reef is about 570 miles. The California earthquake of 1906 which caused so much damage to San Francisco was partly due to a dislocation of the earth's crust along a portion of the San Andreas Rift.

SAN ANGELO, ăn'jĕ-lō, Texas, city and seat of Tom Green County; alt. 1,847 feet; on the Concho River; 77 miles southwest of Abilene; on the Santa Fe Railroad. The town is one of the largest primary wool markets in America and has mohair markets, cottonseed, dairy and petroleum products, sheet metal, stove and saddlery plants. It is a large oil distributing center. Although there was an army camp and small settlement here previously, the town was not firmly established until 1882. Cattle trails and stage lines passed through here and the coming of the railroad in 1888 accelerated the growth of the town's importance as a shipping and supply center. Pop. (1950) 51,889.

SAN ANTONIO, ăn-tō'nĭ-ō, Texas, seat of Bexar County (pronounced bâr), aerial port of entry, and the commercial, financial, cultural, and recreational center of a vast south central Texas area comprising 90 counties. Here the early development of Texas centered. The area still reflects many aspects of its historic Spanish civilization along with that of modern America.

Geography.—San Antonio, at an altitude of approximately 650 feet, is situated about 140 miles from the Gulf of Mexico and about equidistant from the United States-Mexico border at Laredo. It is on the San Antonio River, a nonnavigable stream which winds for miles through the city. The fertile San Antonio Valley, with its rolling terrain to the north and flat, productive, tillable land to the south, affords an excellent water supply obtained from deep artesian wells. The climate is mild and relatively even. The average temperature over a period of years has been: winter, 59.5°F.; summer, 78.7°F.; annual mean, 69.1°F.; with average annual precipitation of 27.39 inches and average humidity of about 54 per cent. There is an average daily temperature variation of 20° with cool Gulf breezes each summer night. The climate is one of San Antonio's major assets and has been a factor, along with the natural resources of the region, in its rapid development since the latter part of the 19th century.

Population and Area.—Over a period of 100 years the population of San Antonio shows the following growth: 1850, 3,488; 1880, 20,550; 1900, 53,231; 1920, 161,379; 1940, 253,854; 1950, 408,442. About 33⅓ per cent of the population is of Latin-American descent, while the next largest group of foreign extraction is German. In 1950 the Negro population was approximately 7 per cent of the total. The city covers 69.4 square miles, while the county covers 1,247 and has a population of 500,460. With few exceptions, the suburbanites earn their livelihood in San Antonio proper.

Government.—San Antonio has the commission type of government, adopted in 1914, with a mayor as the chief executive officer, while the various departments are headed by individual commissioners. Along with the rapid growth of the city, many public improvements have been made. Oil and gas are used almost exclusively for fuel, which aids in keeping the city relatively clean. Both the city public service board, which furnishes gas and electricity, and the city water board are municipally owned. The government welfare program is supplemented by the welfare activities of numerous religious, fraternal, and other organizations. Backed by a progressive city health department, San Antonio's health facilities include a number of modern hospitals.

Industries and Business.—San Antonio is historically the center of trade for the vast south Texas area and is the natural commercial gateway to Mexico from the United States, having Foreign Trade Zone No. 6 located at the municipal airport. This is the first foreign trade zone in the nation to be located inland, served by air, rail, and highway, and operated by private capital.

San Antonio is one of the largest produce exchange markets and one of the leading livestock centers in the United States. Twenty-five per cent of the wool and 85 per cent of the mohair produced in the country are grown just west of San Antonio. In addition to being in the midst of a rich and extensive ranching and farming area, San Antonio is the headquarters for the south Texas petroleum-producing district.

The wholesale and retail trade serves 149 and 90 counties respectively. Main industries include meat packing, coffee roasting, pecan shelling, brewing, and the manufacture of iron and steel products, condiments, soap, candy, cottonseed products, batteries, cement, flour, feed, clothing, sashes and doors, and food. The economic strength of the community lies in the wide diversity of products manufactured, ranching and farming activities, military payrolls, and retail, wholesale, and service trade, all of which sustain employment and commercial activity.

Transportation and Communication.—San Antonio is on three trunkline railroads and a network of modern state and federal highways with motorbus and truck transportation radiating in all directions. It has a municipal airport with airline service available to all corners of the world. It is the home of the Slick Airways, Inc., in 1950 the largest air-freight carrier in the United States. Transportation facilities place the city within easy reach of the deep seaports of Corpus Christi, Houston, and Galveston. The San Antonio Transit Company provides all intracity public transportation by modern, air-conditioned buses. A new multimillion dollar Urban Expressway facilitates traffic to all parts of the city.

Educational, Cultural, and Recreational Facilities.—In 1950 the public school system represented an investment in excess of 17 million dollars and had a total of 62 schools. Of these, 46 were elementary, 10 junior, and 6 senior schools. Seven members constitute the board of the San Antonio Independent School District and

all are elected to office. All senior schools offer college preparatory courses. The San Antonio Vocational and Technical High School offers complete courses in technical training with both day and night classes.

In addition to the public school system, there are numerous nationally known private schools such as Texas Military Institute, St. Mary's Hall, Peacock Military Academy, Ursuline Academy, and San Antonio Academy. There are five institutions of higher learning located in San Antonio: namely, St. Mary's University (1852); Trinity University (1869; moved from Waxahachie in 1942); Incarnate Word College (1881); Our Lady of the Lake College (1912); and the San Antonio College (1925).

The San Antonio Public Library, which has the largest collection of Circusana in existence, has branch libraries conveniently located throughout the city. In addition should be mentioned St. Mary's University Downtown Law Library, and the Bexar County Medical Library.

From the earliest days of its history, San Antonio has been the cultural center of southwest Texas. The San Antonio Symphony Orchestra is recognized as one of the leading symphonies in the nation. The opera season, under the auspices of the San Antonio Symphony Society, offers famous operas with internationally known stars.

The River Art Show, sponsored by the San Antonio River Art Group, is held in April of each year during the Fiesta de San Jacinto celebration on the banks of the San Antonio River in the downtown section of the city. The Pan-American Art Galleries, Witte Memorial Museum, and the River Art Group all maintain permanent galleries.

San Antonio is commonly called the Fiesta City. Entertainment of all kinds, from opera to rodeos, abounds the year round. The Municipal Auditorium, which seats 6,000, and the ultra-modern Bexar County Coliseum, having 7,500 permanent seats, are the center of entertainment activities. In the latter, the San Antonio Livestock Exposition is held in February of each year. This is a 10-day event, offering top rodeo shows daily, livestock exhibits, and commercial displays dealing with the ranching and farming industry. Alamo Stadium and adjacent Alamo Stadium Gymnasium, carved in their natural setting and built from native stone, offer a stream of sports events to the community.

The Fiesta de San Jacinto, a week-long celebration that takes place annually during the week in which April 21 falls, is a period of fun and entertainment comparable to the New Orleans Mardi Gras. Staged as a tribute to the memory of the heroes who won Texas her independence, the brilliant spectacle is by turns solemn and festive, and throughout the week there runs a curious blending of old Spain with the old West, and present-day Latin America with life in a busy North American city. Dark-eyed senoritas with mantillas, and debutantes in the height of modern fashion; cowboy boots and dancing slippers; covered wagons and princely thrones; hillbilly bands and symphony orchestras—all have their roles in this great Southwest pageant.

Special Points of Interest.—Few cities in the United States can compare with San Antonio's points of interest for the visitor. Even modern-day San Antonio reflects the stirring history of the Alamo City. People the world over have studied or read about the famous Alamo, the Mission San José known as "Queen of the Missions," Mission Concepcion, Mission San Francisco de la Espada, and Mission San Juan Capistrano. To these points should be added such sights as the Arneson River Theatre (built on the San Antonio River in the downtown section, with stage separated from the natural grass seats by the river); the Cos House (home of Gen. Martín Perfecto de Cos, early governor); La Villita, meaning "Little Town" (a restoration and reproduction of some of San Antonio's earliest dwellings); the Spanish Governor's Palace (originally used by the Spanish governors of Texas as an office and residence); the Francisco Ruiz House; Buckhorn Curio Shop (site of many frontier gun battles); Brackenridge Park (327 acres), having within its boundaries a golf course, tennis courts, polo field, Witte Memorial Museum, the Pioneer Log Cabin, Pioneer Memorial Hall, Reptile Garden, large, modern Zoological Garden, Japanese Sunken Gardens, and the Sunken Garden Theatre.

The beautified section of the San Antonio River, which winds its way through the entire downtown district is, in itself, a special point of interest to the visitor. One can walk along the river bank or ride in the gondolas that cruise through the business section.

From its earliest days, San Antonio has been a military center. Here are located such important military installations as Fort Sam Houston (1865), and Randolph, Kelly, Brooks, and Lackland Air Force bases. Each is a city within itself. Many of the United States' great military leaders have returned to San Antonio to live in retirement.

History.—The earliest history of San Antonio is found in the records of Álvar Núñez Cabeza de Vaca (1490?–?1557), recounting his visit to the vicinity now known as La Villita. While the earliest construction in Villita, about 1722, comprised homes for the Spanish soldiers and their Indian wives, from before 1500 it had been the village of Cohuiltecan Indians.

Since the time, two hundred years ago, when Spain and France warred for the possession of the fertile lands surrounding San Antonio, the city has been an important military post. The towering buildings of modern San Antonio stand on ground where much of the stirring history of the Southwest was made. The tread of marching men, the gleam of arms in the bright sun are not new sights to the Alamo City. Near the end of the 17th century, French traders developed the route now known as the San Antonio Road, which leads westward from Nacogdoches through San Antonio. It was at this time that the Spanish Franciscan friars began to bring the Cross of civilization into this savage territory. In 1691, at the Indian village called Yanaguana, Father Damien Massanet erected a Cross and rechristened the place San Antonio. The year 1718 was marked by the official establishment of the Mission San Antonio de Valero (later known as the Alamo). Shortly afterward, a few miles away, an imposing structure, Mission San José, was built with Indian labor and under the supervision of the padres. In 1730, the three missions of San Francisco de la Espada, San Juan Capistrano, and Concepcion de Acuna, which originally had been established in East Texas, were reestablished in San Antonio. San Antonio proper was first settled in 1731 by 15 Spanish families

sent from the Canary Islands by the king of Spain. The settlement was named San Fernando de Bexar (originally spelled Bejar), with the governmental headquarters (or offices) housed in a pretentious adobe building, the Governor's Palace, which still stands.

For one hundred years, the royal emissaries from Spain ruled over the section. Hardship became their heritage. The fierce Lipan and Comanche Indians took heavy toll in life and property. Then the power of Spain began to wane, and when the Mexican revolt for independence flared up in 1821, the Spaniards were defeated and San Antonio came under the direct rule of Mexico. Mexico City was hundreds of miles away and Mexico was torn with civil strife. The central government had little time to waste on Texas, so the governing officials at San Antonio ruled as they wished, and wisdom and justice were seldom attributes to these petty despots.

From the East and North began to come English-speaking families. These tall, hardy pioneers in their buckskin shirts and deerskin leggings, were not men to accept injustice placidly. As more Anglo-American settlers came, resentment against the tyranny of the Mexican government grew. As early as 1835, the flames of war broke out, and San Antonio became the scene of armed revolt. In December 1835, Ben Milam and a courageous group of followers took the city from the Mexican general, Martín Perfecto de Cos. This revolt brought all Texas up in arms.

The self-styled "Napoleon of the West," Antonio López de Santa Anna, president and dictator of Mexico, thinking to put an early end to the Texas unrest, sent an army of about 4,000, under the command of Gen. José Urrea, against a small group of American colonists at Goliad (March 1836). The defenders, after surrendering as prisoners of war, were all put to death.

Meanwhile, Santa Anna, commanding in person an army of more than 4,000, concentrated at San Antonio in February. Col. William B. Travis was holding the city with somewhat over 180 men. The Texans fell back into the Alamo (q.v.) and prepared to write in blood an immortal story of bravery and sacrifice. Santa Anna demanded unconditional surrender. A shot from a small cannon within the walls was the answer, and the Lone Star flag was run up from the roof of the hastily improvised fort. For 12 days the gallant defenders of the Alamo withstood the Mexican assault. But on March 6, 1836, the attackers gained entrance, and in the last fierce hand-to-hand struggle every one of the Texans died fighting. Their bodies were piled in front of the Alamo and burned. And the flame which lighted that pyre ignited all Texas, for the fall of the Alamo welded the scattered Texans into a united people. On April 21, 1836, Gen. Sam Houston led an army of Texans against Santa Anna at San Jacinto. The small force smashed into the Mexican general's fine army crying, "Remember the Alamo! Remember Goliad!" and completely routed the army, taking Santa Anna himself prisoner.

After winning independence, the Lone Star State became a nation in its own right. Later, answering the call of blood, the Texans voted to join the Union and Texas became in 1845 a part of the United States. Over San Antonio have flown six proud flags—those of Spain, France, Mexico, the Republic of Texas, the Confederate States of America, and the United States.

With its heritage of romance and grandeur, merged with the sparkling newness of the 20th century, San Antonio stands today one of the great cities of America.

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SAN ANTONIO, a river in Texas, which rises in Bexar County. It is formed by the confluence of the Medina River and Leon Creek. It flows east through Wilson, Karnes, and Goliad counties, a distance of about 200 miles and enters San Antonio Bay, an inlet of the Gulf of Mexico.

SAN ANTONIO DE LOS BANOS, sän än-tō'nyô dā lôz vä'nyôs, Cuba, municipality and town in La Habana Province, 20 miles southwest of Havana. Situated on the Ariguanabo River, the town has mineral springs and baths which make it a summer resort for the residents of Havana. In the immediate vicinity of the town is the Vuelta Abajo region, famous for its tobacco. The town was founded in the middle of the 18th century as a camp for Mexican convicts. Early in the 19th century, coffee estates were established here, but later tobacco became the chief product. Population (1943) 14,456.

SAN BENITO, săn bĕ-nē'tō, Texas, a city in Cameron County; altitude 35 feet; 18 miles northwest of Brownsville on the Missouri Pacific Railroad. It is the trade center of an agricultural region producing citrus fruits and vegetables. Because of its close proximity to the Mexican border and the Gulf of Mexico, it is a center for recreation. The city was founded in 1908 and incorporated in 1910. Population (1940) 9,501; (1950) 13,271.

SAN BERNARDINO, bûr-nĕr-dē'nō, Calif., city and seat of San Bernardino County; altitude 1,054 feet; 58 miles east of Los Angeles; on the Union Pacific, Southern Pacific, and Santa Fe railroads. It is located in a region where citrus fruit is extensively grown and it is a shipping point for fruit, grain, and lumber. Here are railroad shops, foundries, cement and color printing plants, refrigerator car, dress, wine, dairy product and plumbing material industries. Nearby are deposits of silver, potash, borax, and cement. San Bernardino Valley College is located here, and there are an unusually large number of churches of many denominations. Promoting musical interests in the city is the San Bernardino Valley Concert Association. The National Orange Show, held annually since 1915, has permanent exposition buildings. To the northeast of the city is San Bernardino National Forest. The original settlement was named when missionaries entered the valley, in 1810, on the feast day of San Bernardino of Siena. A Mormon colony settled here in 1851 but these settlers were recalled to Utah by Brigham Young in 1857. San Bernardino was incorporated as a city in 1886. Pop. (1950) 63,058.

SAN BERNARDINO, (1) a range of mountains in the southwestern part of California. Although by some considered one of the Coast Ranges, they are more properly thought of as a continuation of the Sierra Nevada.

(2) A peak of the San Bernardino Mountains. Its height (10,630 feet) is exceeded by San Gorgonio (11,485) six miles to the east.

SAN BERNARDINO, a strait of the Philippines between the extreme southeastern point of Luzon and northwestern Samar, about 27 miles long and 5 miles wide. Together with the Sibuyan Sea and the Verde Island Passage, it forms the main channel for ships from the United States and the Pacific to Manila and the South China Sea. Near the great rock was fought an important naval battle in October 1944.

SAN BLAS, blăs, **Isthmus of,** the narrowest section of the Isthmus of Panama, between the Gulf of San Blas on the north and the Bay of Panama on the south. It is about 31 miles wide. The Cordillera de San Blas lies across this area from east to west. Along the northern coast of the isthmus is a part of the San Blas Archipelago, which in inhabited by the primitive Cuna or San Blas Indians.

SAN BUENAVENTURA. See VENTURA, Calif.

SAN CARLOS, säng kär'lôs, Chile, town in the Province of Ñuble, in the south central part of the country, on the main railroad of Chile, 15 miles northeast of Chillán. Pop. (1940) 9,411.

SAN CARLOS, Philippines, municipality, Province of Pangasinan, Luzon, on a tributary of the Agno River, and on the Manila-Dagupan Railroad, 10 miles southeast of Lingayen. It is the center of a fertile agricultural region. Pop. (1939) 47,334.

SAN CRISTOBAL, krês-tō'bäl (in full SAN CRISTÓBAL DE LAS CASAS; commonly called LAS CASAS), Mexico, city of the State of Chiapas, about 40 miles east of the capital, Tuxtla Gutiérrez. It occupies a high (7,000 feet), fertile, and beautiful valley on the eastern slope of the central mountain range. It is the see of an archbishop and has a cathedral, several convents, a university, a grammar school, a hospital, and a handsome capitol. It has an active trade, especially in coffee; it also has manufactures of earthernware and coarse textiles. The chief occupation, however, is the raising of cattle, horses, mules, and swine. The town was founded in 1538 on the site of the ancient Zacatlan, and named in honor of the celebrated Bishop Bartolomé de Las Casas who lived there. Pop. (1940) 11,768.

SAN CRISTOBAL (also known as CHATHAM ISLAND), one of the Galápagos Islands, in the Pacific Ocean. The administrative center of the Galápagos Islands, San Cristobal, is located there. Sugar cane and coffee are grown.

SAN DIEGO, săn dĭ-ā'gō, Calif., city, port of entry, and San Diego County seat; altitude sea level to 822 feet; on San Diego Bay, an arm of the Pacific Ocean, and on the San Diego River which flows into Mission Bay, to the north; 125 miles south of Los Angeles and about 12 miles north of the Mexican border. It is served by the Atchison, Topeka and Santa Fe and Arizona Eastern railroads; has a municipal airport (Lindbergh Field), transcontinental air service, and steamship service to domestic and foreign ports. San Diego is the oldest Spanish settlement in California and still reflects in numerous ways the easygoing spirit of the mission era. The business section is modern, but within it are numerous structures reminiscent of the last decades of the 19th century. On the northeastern edge of the business district is Balboa Park, around which the residential section has been built up. To the west is Middletown, a narrow strip of land between the bay and the low hills, where live many Italian fishermen and employees of the airplane factories. Northwest of Middletown is Old Town, site of the original Spanish settlement. In the Logan Heights district, south and east of the business district, are small Mexican and Negro communities, and on the bay side of Point Loma is a colony of Portuguese fishermen.

San Diego Bay, landlocked, and safe at all seasons, is one of the ten great natural harbors of the world. It is 12 miles long, one to three miles wide, and has an area of 22 square miles, with 40 feet of water over the bar at low tide. San Diego is the headquarters of the 11th Naval District, and the site of one of the country's most important naval bases. It is also the site of a naval training station, a Marine Corps base, naval air station, destroyer base, Coast Guard base, naval hospital, naval supply depot, naval radio station, and other naval establishments. San Diego is a training center for navy pilots, and a trial ground for land and sea planes.

Industries.—The largest and most important industry of San Diego is aircraft construction. Here are located the plants of the Consolidated Vultee Aircraft Corporation, the Ryan Aeronautical Company, the Solar, Rohr, and other concerns making planes or parts. Other leading industries include fishing and fish packing, boat building, sheet metal work, brewing, etc.

Cultural Activities.—San Diego has an excellent system of public, private, and parochial schools, and is the site of San Diego State College, and Brown Military Academy, while at Carlsbad-by-the-Sea, 35 miles away, is the San Diego Army and Navy Academy. Libraries include the San Diego Public, with 13 branches and 8 stations; the San Diego County, San Diego Scientific, San Diego Law and the San Diego Metaphysical libraries. A fine arts gallery is located in Balboa Park, as is also the Spanish Village Art center, and there is an art center in La Jolla. Musical organizations include the Amphion Club, which gives six concerts during the winter months; the Civic Symphony Orchestra which conducts the Midsummer Nights' Symphonies during the summer in Balboa Park; and the Philharmonic Society, which presents the Los Angeles Symphony Orchestra in a series of six concerts during the winter, while band concerts are given every week by various organizations, including bands of the Naval Training Station and other service organizations.

Parks.—There are in San Diego 27 parks with a combined area of 2,350 acres. The largest is famous Balboa Park, 1,400 acres, located in the heart of the city, and noted for its semi-tropical trees and plants; its zoo containing many rare specimens; and the great Spreckels open-air

organ. Many buildings in the park house cultural exhibits. Near San Diego are seven state parks, one private park, Cabrillo National Monument and Cleveland National Forest. In Palomar Mountain State Park, 68 miles away, is the Palomar Observatory of the California Institute of Technology, famous especially for its 200-inch telescope, by far the largest in the world. The city offers many attractions to tourists, including salt and fresh water fishing, swimming, golf, tennis, and yachting. In addition to the places mentioned, points of interest include La Jolla, Coronado Islands, Tijuana in old Mexico, Warner's Hot Springs, Pacific Beach, Mission Beach, Carlsbad, Ramona's Marriage Place, Fort Stockton, Casa Bandini, and numerous other places.

History.—San Diego was discovered Sept. 28, 1542 by Juan Rodríguez Cabrillo, a Portuguese navigator sailing in the employ of Spain. Sixty years later (Nov. 10, 1602) it was given its present name by Sebastián Viscaíno in honor of San Diego de Alcala, a Spanish saint. San Diego Mission, first in the California chain, was dedicated July 16, 1769 by Fra Junípero Serra. The first non-Spanish ship to enter San Diego Bay was the *Discoverer,* commanded by Capt. George Vancouver, a British explorer. Its arrival in November 1793, resulted in the construction by the Spaniards of Fort Guijarros on Ballast Point. Following Mexico's successful revolt against Spain, San Diego was made the capital of California in October 1825, when the first duly appointed Mexican governor arrived. The war between the United States and Mexico brought American troops into California in 1846. Maj. John C. Frémont, United States Army, and his California Battalion, 166 men, arrived at San Diego July 29, 1846 aboard the U. S. sloop-of-war *Cyane,* commanded by Samuel du Pont. Shortly afterward Frémont marched away to take Los Angeles while Commander du Pont ordered the United States flag raised in the San Diego Plaza. In November 1846 Commodore Robert F. Stockton, commanding the U.S.S. *Congress,* arrived at San Diego and retook the town which had been captured by the California Rangers. The commodore improved the fort and renamed it Fort Stockton. In the meantime, Gen. Stephen W. Kearny, United States Army, with Kit Carson as guide, was making his famous march from Fort Leavenworth, Kans., to California. At Warner's, early in December, he was told by a San Diego party that the Rangers were near by. Kearny, however, ordered his command to proceed. At San Pasqual he was met by a force under Gen. Andres Pico and defeated, Dec. 6, 1846. However, he finally reached San Diego on December 12, and from that time on the city has been an American community. San Diego was incorporated as a city March 27, 1850. Pop. (1940) 203,341; (1950) 334,387.

Consult Smythe, W. E., *History of San Diego* (San Diego 1907).

SAN DOMINGO, săn′ dô-mĭng′gō. See Santo Domingo.

SAN FELIPE, săm fâ-lē′pâ, Chile, an agricultural town and capital of the province of Aconcagua, about 48 miles north of Santiago, in the fertile valley of Aconcagua. It is an interesting, regularly built town, with an attractive central square and highly improved boulevards. It was founded in 1740. Pop. (1940) 13,168.

SAN FELIPE INDIANS, săn fâ-lē′pâ, a Pueblo tribe of New Mexico. See Keresan.

SAN FERNANDO, Philippines: (1) municipality, province of Cebu, on the east coast, 17 miles southwest of the city of Cebu, the provincial capital. Pop. (1939) 17,562.

(2) municipality, capital of the province of Pampanga, central Luzon, on the Manila-Dagupan Railroad, 35 miles northwest of Manila. It is the railroad shipping point for Bacolor, with which it is connected by highway, and is an important center of the sugar industry, containing sugar mills and warehouses. It is also the center of extensive rice cultivation. During World War II it was recaptured by the Americans Jan. 29-30, 1945. Pop. (1939) 35,662.

(3) municipality, capital of the province of La Union, northwest Luzon, on San Fernando Bay, 45 miles north of Dagupan. It is on the coast highway and also on the Manila-Dagupan Railroad. It also has frequent communication with Manila by sea. Fishing is an important industry. Pop. (1939) 23,366.

There are three smaller towns of the same name: pueblo, province Ambos Camarines, Luzon; pueblo, Ticao Island, province of Masbate; pueblo, province of Zambales, Luzon.

SAN FERNANDO, Spain, seaport on the Isla de León, 7 miles southeast of Cádiz, in the province of Cádiz. It is a fortified town now built in modern style. There are two churches, two hospitals, a naval academy and workshops, an extensive arsenal, a fine observatory (the southernmost of Europe), and an iron foundry. It has numerous domestic industries and a brisk trade in salt. At one time it was probably a Carthaginian settlement. The arsenal was built in 1790. Formerly known as Isla de León, the town received its present name in 1810. Pop. (1940) 38,581.

SAN FRANCISCO, frăn-sĭs′kō, Calif., city, port, and port of entry. Almost surrounded by water, enthroned on hills, San Francisco is spread over the tip of a peninsula with elevations ranging from below sea level to 933.6 feet (U.S. Base). A city of brilliance and charm, strategically centered on the Pacific coast, it is the heart of the vast central empire of California—one of the richest and most diversified—and a great seaport on one of the finest landlocked harbors in the world. Internationally recognized as the financial, commercial, industrial, and management center of the Pacific Coast region, San Francisco is a major supply base and distribution center for the agricultural, manufacturing, and mining industries of the area. It is also one of the nation's important cultural centers for music, art, and higher education, and one of the two greatest communication centers between the United States and the rest of the world. Traditionally a shipping center of world renown, its trade doors open to global highways where streams of commerce have coursed for centuries, linking San Francisco with the great cities of Europe and Asia.

Geography.—San Francisco is surrounded on three sides by the waters of the sea: the Pacific Ocean on the west; the Golden Gate on the north; and the San Francisco Bay (q.v.) on the east. It is joined with the East Bay communities by the San Francisco-Oakland Bridge, and with

the Marin Peninsula to the north by the Golden Gate Bridge. To the south it merges with the San Francisco Peninsula communities, which are connected by four major highways—Bayshore Highway (U.S. 101), El Comino Real (the King's Highway), Skyline Boulevard, and Ocean Shore Highway. Much of the present city easterly of Kearny and 3d streets rests on man-made land.

Behind the Golden Gate at half tide are 456 square miles of bay. San Francisco Bay proper comprises 262.7 square miles, San Pablo Bay 106.8 square miles, Suisun Bay 47.9 square miles, and other miscellaneous areas 38.6 square miles. San Francisco's east boundary and the west boundary of Oakland, Berkeley, Richmond, and Albany are common to each other and meet in the waters of the bay. In all, 12 contiguous central cities with a population of 1,521,923 (1950) are linked together in a chainlike manner around the shores of San Francisco Bay.

Within a 50-mile radius of San Francisco are 61 incorporated communities: on the San Francisco Peninsula there are 21, the four largest being San Jose, San Mateo, Palo Alto, and Burlingame; in the East Bay area, 20, led in size by Oakland, Berkeley, Richmond, and Alameda; and in the North Bay area, 20, including Vallejo, Santa Rosa, San Rafael, and Napa.

Sections of the City.—San Francisco's waterfronts, hills, variable climatic conditions, people, and periods of expansion have tended to create a number of sections within the city. Master planning instituted since World War II has resulted in more unified development. Following are the major sections of the city. Market Street runs through it diagonally southwest to Twin Peaks. The section north of Market Street from the bay to Van Ness Avenue contains some of the earliest historical landmarks; the downtown business and financial district; the hotel, theater, and shopping district centering around Union Square; the apartment house district; Nob Hill, Telegraph Hill, Russian Hill, Chinatown, the Italian quarters; a large section of the waterfront bordering the Embarcadero; the commission district and some manufacturing.

The Western addition lies north of Market Street between Van Ness Avenue and Arguello Boulevard and is chiefly residential, including Pacific Heights, Marina, and Fillmore districts.

The Richmond section with the contiguous Sea Cliff area lies between the Presidio and the Golden Gate Park and extends from Arguello to the ocean. It is one of the older residential areas and comprises many substantial homes and some newly developed tracts. It includes the Geary and Clement streets shopping districts.

South of Golden Gate Park to Sloat Boulevard and west of Twin Peaks to the ocean is the expansive Sunset District. Many of the city's newest single-family homes are in this area.

South of the Sunset area to the city's south boundary is the Lake Merced district which includes many of the newer residential developments—Park Merced, Lakeside, Stonestown villages, and the newest business districts.

Westerly of Twin Peaks sloping down to the Lake Merced section are Forest Hills, West Portola, St. Francis Wood, and Ingleside districts, principally residential areas.

South of Market Street, extending to the city's south line, between the bay and Mission Street are the Potrero and Bay View sections—the principal industrial areas of the city but also containing many homes and several large public housing projects and the San Francisco Naval Shipyard.

South of Market Street between the Potrero district and Twin Peaks is the Mission section, a warm sheltered area, where occurred some of the city's earliest developments including the establishment of Mission Dolores. The Mission business district is second largest.

A certain degree of self-sufficiency exists in most of the sections throughout the city but there are strong ties with the downtown district. The many steep streets offer no obstacle to heavy traffic. Two important cable car thoroughfares are Powell Street with a 17 per cent maximum grade, and California Street, with a 16 per cent maximum. The city engineer lists 23 streets with grades over 20 per cent.

Islands in San Francisco.—Alcatraz Island (q.v.), lying off the north side of San Francisco Peninsula in San Francisco Bay and resembling a huge battleship, is known as "The Rock" to the nation's underworld. From 1858 it was used as a disciplinary barracks for military prisoners. In 1933 it became a federal penitentiary. It has a capacity of 800 persons and has housed many of the country's most notorious criminals.

Yerba Buena Island, one of the connecting links in the San Francisco-Oakland Bay Bridge, has been in the government's possession since 1866 and in 1898 became a naval training station. First known as Wood Island, it then became Yerba Buena, then was officially named Goat Island, and finally in 1931 was officially designated by the United States Geological Board as Yerba Buena Island.

Treasure Island, connected with Yerba Buena by a causeway, was created as the site of the Golden Gate International Exposition (1939–1940), and is now occupied as a United States naval training base.

The Farallon Islands, comprising two separate groups approximately eight miles apart and about 35 miles west of San Francisco in the Pacific Ocean have been included since 1872 in the city and county of San Francisco. The only occupants are the United States Light House Service people and the operators of the Radio Beam Compass Station. Since 1855 the islands have been closed to the public.

Climate.—San Francisco is one of the few nature air-conditioned cities with a clean, fresh, bracing, climate—relatively warm in winter and cool in summer. Longtime records of the Weather Bureau report daily mean maximum temperature of 62.6°F. and daily mean minimum temperature of 50.4°. The annual monthly mean temperature is 56.5°; the coldest month, January, averages 50.1°, and September, the warmest, averages 61.5°. The rainfall averages 22 inches annually and occurs principally from November through April, with less than an inch in October and May, and only a trace in the months of June, July, August, and September. The sun shines in San Francisco 66 out of every possible 100 hours, with June the brightest, rising to 76 out of every possible 100 hours.

San Francisco's topography and location at the tip of a peninsula, beside the inlet between the ocean and the great valleys of California, have an important influence on the variable climates found in the different sections of the city. Due to the prevailing air currents, the hours of fog, which are frequent in July and August in

some sections of the city, rarely occur in other sections. The Lighthouse Service records reveal that the hours of fog on San Francisco Bay average only 153 out of the 8,760 hours which are in a year.

Area and Population.—San Francisco city and county are coextensive, containing 93.1 square miles, but more than half of this area includes a part of San Francisco Bay. The land area of the city alone comprises 44.82 square miles. The compact land area with tide lands fully reclaimed are planned as follows: residential—33.5 per cent; industrial—10.1 per cent; commercial—4.8 per cent; educational—2.1 per cent; recreational—12.2 per cent; institutional—1.8 per cent; military reserves—6.2 per cent; streets—25.3 per cent; utility and water lands—3.3 per cent; vacant—0.7 per cent.

In 1950, the population of San Francisco was 775,357. The number of people who come to San Francisco on business and pleasure increases the average daily population by about 200,000. The San Francisco metropolitan area, as defined by the United States Bureau of the Census, comprises Alameda, Contra Costa, Marin, San Mateo, Solano, and San Francisco counties. The population of this area in 1950 was 2,240,767.

The residents of San Francisco form one of the most democratic and cosmopolitan groups of people in the world. Every state and more than 34 foreign countries have shared their sons and daughters with San Francisco. The population of the city includes people from almost every section of the civilized world. About one third of the population is between 20 and 40 years of age.

Industry and Business.—San Francisco is a prominent production and buying center, a distribution center, and one of the nation's major supply bases. It is well equipped for exchange of goods and services and two-way trade. It is the financial and insurance capital of the West. It is headquarters of one of the world's largest banks (Bank of America) and of seven of the nation's largest banks; also headquarters of the Twelfth Federal Reserve District and the Federal Reserve Bank of San Francisco, and the nation's second largest security market. The expeditious handling of financial transactions has contributed greatly to the sound industrial and trade relations in the West.

Long a dominant port on the Pacific coast in world trade, many products of the regional West are assembled and processed here for world markets.

In May 1950, about 471,000 people were employed in San Francisco, including those living outside San Francisco in the metropolitan area. The rank of the major industry groups, based on number of employees, was: service, retail trade, manufacturing, wholesale trade, transportation, finance, government, construction, and some agricultural and mining groups, though often only the head offices of these last two groups.

As of 1947, there were 3,671 establishments in the San Francisco metropolitan area turning out products of one kind or another. More than half of these establishments were in San Francisco itself. That year the area used an average total of 163,641 employees in these establishments, of whom more than 131,000 were production workers. The United States Census of Manufactures for 1947 showed that the value added by manufacture by the 3,671 establishments in the metropolitan area amounted to $1,049,490,000, placing this area 10th in rank among all the manufacturing areas of the United States. In the five following industries the value added by manufacture was greatest: food and kindred products ($244,184,000), chemicals and allied products ($118,601,000), transportation equipment ($98,062,000), printing and publishing ($97,102,000), and fabricated metal products ($87,181,000).

Transportation and Communication.—San Francisco's excellent transportation and communication facilities focused on the Pacific coast make it one of the foremost centers of distribution in the nation. Converging here is a vast transportation network of transcontinental railroad lines, air transport services, steamship lines, highways, bus and truck lines.

Four mainline railroads serve San Francisco direct. These railroads by means of seven major transcontinental routes and connecting routes provide fast dependable service which is available to all parts of the United States, Canada, and Mexico. San Francisco's waterfront is state-owned and operated, and the piers and many industries north of Market Street are connected with the mainline railroads by the State Belt Railroad, operating along the waterfront.

Store-door pickups and delivery service for less than carload traffic is offered between San Francisco and practically all points in California and neighboring states. Overnight delivery is provided to the Sacramento and San Joaquin valleys and along the coast to Los Angeles.

Many steamship lines operate between San Francisco and other world ports, including those of the Pacific Islands, the Orient, South America, Europe, Africa, and the Atlantic and Gulf Coast. The port is also served by luxury passenger lines sailing to the Hawaiian Islands, the Orient, and around the world.

Many trucklines radiate over state and federal highways between San Francisco and other California points and neighboring states. In 1950 more than 600 truck operators having headquarters or agencies in San Francisco held intrastate or interstate permits. Numerous buslines provide frequent service between San Francisco and other points on the main highways, with four lines providing transcontinental service.

Bridges.—The San Francisco-Oakland Bay Bridge, a steel and concrete structure, opened to vehicular traffic on Nov. 12, 1936, required 3 years, 4 months, and 3 days to build. The bridge including the electric rail facilities cost $77,200,000 and was originally financed through revenue bonds purchased by the Reconstruction Finance Corporation. The total length of the bridge project end to end of approaches is 43,500 feet, or 8¼ miles. The total length of the navigable water span is approximately 12,000 feet. The bridge without approaches including island crossing is 23,000 feet long or approximately 4½ miles. The structure crossing the west channel comprises two complete suspension bridges with the central anchorage approximately in the middle of the west channel. The vertical clearance ranges from 200 to 218 feet above low water. The suspension towers are 474 feet and 519 feet above water.

An interesting unit of the bridge structure is the tunnel passing through Yerba Buena Island—76 feet wide, 58 feet high, and 540 feet long. The east channel is crossed by a cantilever span of 1,400 feet with two 510-foot anchor arms and

five truss spans of 509 feet each. Some of the pier foundations are the deepest underwater ever constructed, with one pier 235 feet below water and another approximately 200 feet. The two suspension cables are 28¾ inches in diameter and each contain 17,464 wires.

The entire structure is double-decked. Six lanes are provided for automobile traffic on the upper deck and three for trucks and stages on the lower deck, with two interurban electric line tracks. Operation of bridge train service commenced Jan. 15, 1939. Train and bus passengers numbered 20,697,905 in 1949, and vehicles crossing exceeded 27,339,680.

Actual construction on the Golden Gate Bridge commenced Jan. 4, 1933; the bridge was opened to pedestrian traffic May 27, 1937, and to automobile traffic on the following day. The bridge was financed by a bond issue of $35,000,000. The length of the bridge from bridgehead to bridgehead is 6,400 feet and from portal to portal 8,940 feet. There are six traffic lanes and two sidewalks. The main span, center to center, of piers is 4,200 feet, longest in the world. The clearance is 210 feet at piers and 220 feet at center, above mean high water. The two steel towers are 746 feet above water, or 191 feet taller than the Washington Monument. The distance from the base to top of the San Francisco pier is 846 feet—the highest and largest bridge tower in the world. Each cable is 7,660 feet long and 36½ inches in diameter and contains 27,572 wires. The distance between the two cables, center to center, is 90 feet. Vehicles crossing in 1949 totaled 9,014,972.

Air Transporation.—San Francisco and the bay area are tied together with the rest of the United States and the world by more than 20 major government certificated and noncertificated carriers offering passenger and cargo service. San Francisco International Airport is recognized as one of the world's major terminals and serves not only national lines but many lines operating to the Hawaiian Islands, Asia, and the Orient.

Communications.—One of the two-world communication centers in the nation is established in San Francisco. Regional headquarters of four major radio communication systems and one cable system direct their transpacific communications from San Francisco. The telephone and telegraph companies connecting the western regional areas with the nation are headquartered here. Other communications centered in San Francisco are the navy's Western Sea Frontier and the army's western command and relay stations for the Pacific overseas area; the Civil Aeronautics Administration operating the West Coast Overseas Foreign Air Communications station which gathers and disseminates important weather information throughout the vast radio network covering the Pacific and the Orient; the Aeronautical Radio, Inc., which serves the commercial airlines.

Government.—The site of the local government for the half century following the founding of the Presidio in 1776 was in one of the two-roomed houses of the military commandant. But on Dec. 7, 1834, citizens of Yerba Buena, on orders of Governor José Figueroa, assembled at the Presidio to choose electors for the *ayuntamiento* (district council). Francisco de Haro was chosen first alcalde (mayor) under Spanish rule of the Pueblo Yerba Buena.

On July 9, 1846, Capt. John B. Montgomery with 70 sailors and marines from the U.S.S. *Portsmouth*, dropping anchor in Yerba Buena Cove, came ashore and ran up the Stars and Stripes on Mexico's flagpole atop the adobe custom house, as the *Portsmouth* gave a 21-gun salute; on that day the rule of the village of Yerba Buena passed to the United States. On August 6, the captain appointed Lieut. Washington Alan Bartlett of the United States Navy as the first American alcalde of Yerba Buena.

During the next few years there were often disputes as to jurisdiction in the settlement. San Francisco received its first charter from the state's first legislature on April 15, 1850, leading California's admission to the Union on Sept. 9, 1850, by almost five months. The elected officers under the new charter held their first meeting on May 9, 1850. A year later a new city charter was adopted by the legislature. The Consolidation Act of 1856 authorized a merger of the city and county of San Francisco and created a board of supervisors. This new form of government was to last for 44 years.

In 1900, the electorate accepted a freeholder's charter which stood for 31 years. The charter outlined a policy for municipal ownership of utilities and set up a system of civil service. The Municipal Railway's first city-owned street railway in the nation began operation on Dec. 8, 1912, and in 1914 the city gained control of the Hetch Hetchy watershed near Yosemite which eventually supplied 400,000,000 gallons of water daily. The present charter, approved by the people in March 1931, became effective Jan. 8, 1932.

Under the state constitution the charter is not only the organic law of the city but it is also a law of the state within the constitutional limitations and free from any interference by the state through general laws. The charter is not a grant of power, but rather an instrument which accepts the privilege granted by the constitution of complete autonomous rule with respect to municipal affairs, and which otherwise serves merely to specify the limitations and restrictions upon the exercise of powers so granted and accepted.

The governmental structure of the city and county of San Francisco is both a county and a municipal corporation, and the functions performed by its officers in each instance determine whether it is to be viewed as a city or county.

The government consists of two branches: the legislative branch, made up of the board of 11 supervisors, and the administrative branch, presided over by the mayor and the chief administrative officer. The latter is appointed by the mayor. Elective officers are mayor, city attorney, assessor, district attorney, treasurer, sheriff, and public defender. Members of the board of supervisors and municipal court judges are also elected by the people.

Education and Culture.—San Francisco's educational facilities are outstanding in the West and rank among the nation's best, covering nearly all fields. In addition to the public school system, there are a number of private, parochial, nonsectarian, and technical schools. The public schools include the kindergarten, elementary day schools and special schools, junior and senior high schools, continuation and adult day and evening schools, and a junior college. Under the jurisdiction of the city department of education, there are 196 schools with a total average daily

attendance in 1950 of 76,211 students. The public school properties are valued at about $52,000,000.

The parochial school system, administered by a board of education of eight members and a superintendent and other assistants, comprises elementary schools, high schools, and academies for boys and girls.

Near the east end of Golden Gate Park is located the University of San Francisco with a 20-acre campus. It was founded in 1855 as St. Ignatius College and was chartered by the state in 1859. The name was changed in 1930. San Francisco State College, founded in 1899 for teacher training, is also located within the city, as is the City College of San Francisco, a municipal institution founded in 1935, and the San Francisco College for Women, a Roman Catholic institution founded in 1930. In addition, the University of California maintains several branches in San Francisco, including colleges in medicine, dentistry, pharmacy, law, and the California School of Fine Arts. Stanford University's colleges of dentistry and medicine are also located in San Francisco. The University of California at Berkeley and Stanford University at Palo Alto are both within comfortable commuting distance of San Francisco. Other institutions of higher learning in the immediate area, offering standard curricula, include the Dominican College at San Rafael and Mills College at Oakland. Many educational institutions have been approved to offer training to veterans.

There are also many centers of cultural interest such as the California Academy of Sciences; the Civic Center; libraries, both public and private, art museums, and concert halls.

Innumerable religious, civic, professional, business, historical, military, and foreign organizations have headquarters in San Francisco and hold regular meetings.

Buildings.—*Civic Center.*—The actual concept of the Civic Center was retarded by the destruction of the City Hall during the 1906 earthquake and fire, and it was not until 1912 when plans for the Panama-Pacific International Exposition were being considered, that a permanent staff of architects was appointed and a bond issue of $8,800,000 was authorized for purchase of land and construction of buildings.

The group of buildings includes the City Hall, started April 5, 1913, and dedicated Dec. 28, 1915 at a cost of $3,500,000. The dome is 308 feet above ground and is 112 feet in diameter. It is constructed of granite in French Renaissance style, occupies two blocks, and has been visited by many renowned persons, including some of the kings and queens of Europe and two presidents of the United States.

The Civic Auditorium was built in 1914 in connection with the Panama-Pacific Exposition at a cost of $1,350,000. The building contains one of the largest pipe organs ever constructed. Many great national conventions have been held here, including the 1920 Democratic Convention.

The San Francisco Public Library was completed in 1917 at a cost of $1,152,067, the city contributing $766,170 and the Carnegie Foundation $275,897. Here is housed the James D. Phelan Memorial, a collection of manuscripts and first editions of the works of California writers.

The War Memorial group, which comprises the Veterans War Memorial Building and the Opera House, was completed in 1932 at a cost of $6,125,000, $2,000,000 of which was reported raised by public subscription and $4,000,000 by bond issue. The Veterans Building contains the galleries of the San Francisco Art Association, and a gallery containing relics of the Civil, Spanish American and world wars. The Opera House was opened Oct. 2, 1932, with Lily Pons singing Tosca. The auditorium seats 3,285 persons. The stage is 131 feet wide, 83 feet deep, and 120 feet from roof to floor. It was in these buildings that representatives from many nations met in 1945 to construct a charter and establish an international organization to be known as the United Nations.

The Public Health Building was completed in 1933 at a cost of $709,110.

The Civic Center also includes the State Building completed in 1923 at a cost of $1,560,000 and the Federal Office Building at a cost of approximately $3,000,000, bringing the total city, state, and federal investment in land and buildings to approximately $22,000,000. To duplicate them today would require probably three times that amount. The State Building houses the Hastings College of Law of the University of California.

Commercial Buildings.—One of the interesting structures of San Francisco is the Ferry Building at the foot of Market Street. Completed in 1903, it has a central tower 240 feet high at the top of which is a clock with four faces, each dial being 22 feet in diameter with numerals 3 feet high. On April 18, 1906, the clock was stopped at 5:16 A.M. by the great earthquake that preceded the fire which devastated an area of 520 blocks and approximately 25,000 buildings. A large relief map of California runs along the entire second floor corridor. The Ferry Building is the San Francisco terminus for the Southern Pacific and Western Pacific railroads. In 1939 the Southern Pacific Company transferred its headquarters from New York to San Francisco, where it has a large office building on lower Market Street. The main post office building on Mission Street was completed in 1905 and survived the disaster of 1906.

Back from the waterfront several skyscrapers tower above the mass level, including the Pacific Telephone and Telegraph Company Building, 26 stories, the Russ Building, 31, and the Sutter Building, 25. Other prominent buildings include the Pacific Gas and Electric Company Building, Matson Building, Hobart Building, Mills Tower Building, Standard Oil Building, Shell Oil Building, Federal Appraisers Building, Western Merchandise Mart, and Metropolitan Life Building. The United States Mint Building on a height west of the Civic Center was finished in 1937. It is a rugged structure, five stories high in front and three in the rear, built of reinforced concrete and granite. The San Francisco Stock Exchange operates a 10-story office building and a one-story trading room, formerly the United States Sub-Treasury Building. The Union Square Garage is among the nation's most interesting buildings; it extends four stories below the surface of Union Square, and will park 1,700 cars simultaneously, or the equivalent of one fourth of all the curbside parking facilities in the downtown area.

The present Cliff House was built in 1907, was closed for a period of some years, then remodeled and reopened. Its two predecessors were destroyed by fire—the original building in 1894, the second in 1907. From the beginning it

has been a noted restaurant. It is perched high on a cliff overlooking the Pacific, at the northwestern corner of the city, west of the Presidio. From a lookout platform one may see the Seal Rocks where at times hundreds of sea lions lie sunning themselves. On clear days the Farallon Islands can be sighted.

Churches.—The Mission Dolores, one of the most interesting of the city's houses of worship (of which there are some 353 representing most denominations), was founded in 1776. The surviving adobe building was begun in 1782. No nails were used by the Indian builders; the roof beams were fastened with leather thongs. The interior was decorated with paint made of vegetable juices, in colors that have survived more than 150 years. Grace Cathedral represents the modern city, as the mission represents the original settlers; it is of gray stone, in modified Gothic style, with a carillon and many interesting relics. St. Patrick's Church and Old St. Mary's Church (not to be confused with St. Mary's Cathedral) go back to the San Francisco of the 1850's. Material and bells for Old St. Mary's were brought from China; the church is in Chinatown and has a Chinese branch. St. Mary's Cathedral was built in 1891 and survived the fire of 1906. It is the seat of the Roman Catholic diocese of San Francisco. St. Brigid's Church was built of old street paving blocks. In the Italian section is the Church of Sts. Peter and Paul. In the Pacific Heights district is Temple Emanu-el, a cream-colored building of modified Byzantine design, with a dome of red tile. The Tin How Temple is the oldest Chinese place of worship in the city; the Kong Chow Temple is the largest.

Hotels.—Among its 577 hotels San Francisco has several with interesting histories. The Palace Hotel replaces an original structure, destroyed by fire in 1906, in which a driveway was so arranged that guests could drive up to the desk. The great fire of 1906 was hardly through smoldering when a banquet was held in what remained of the St. Francis Hotel to introduce the period of reconstruction. Both built after the fire of 1906, the Mark Hopkins and Fairmount hotels are notable buildings; both have interesting ornamentation, especially the former's murals of early California history. From the "Top of the Mark" one has a magnificent view of the city and the whole bay area with its bridges.

Clubs.—The Olympic Club, organized in 1860, is an amateur athletic club. The Bohemian Club has a membership of artists and writers as well as friends of art and literature. The Native Sons of the Golden West and the Pacific Union Club have interesting houses of their own.

Special Points of Interest.—There are innumerable special points of interest in San Francisco which cannot be included here, but are described in careful detail in many of the books on San Francisco (see *Bibliography*).

A ride on the little cable cars continues to be a major experience, because of thrilling vistas to be seen as the cars glide over the steep hills.

On top of Telegraph Hill, which towers above the bay shore to a height of 300 feet, is Pioneer Park. From its center rises the Coit Memorial Tower, installed in 1933. Built of concrete in the form of a cylinder, it is 210 feet high and affords a wide view of the city and the bordering bay. Around Telegraph Hill is centered the Latin Quarter where many foreign restaurants cater to every taste.

Just westward stands Russian Hill, the crest of which was once used as a burying ground for Russian sailors. Now the hill is covered with residences, apartment houses, and the studios of many artists and writers.

South of here stands Nob Hill, so called because on it once stood the castle-like homes of the city's wealthy nabobs. It is now covered with hotels and apartment houses.

Somewhat northeast, in the heart of old San Francisco, lies San Francisco's famous Chinatown, covering a dozen squares or blocks, lined with Chinese restaurants, bazaars, theaters, joss-houses or temples, and shops of various kinds. But it is not the Chinatown of old, when gambling places and opium dens were almost as numerous as are the bazaars today. That passed out with the great fire of 1906.

Following the bay shore for three and a half miles is the Embarcadero, a crescent-shaped street edged with piers and wharves. Here at the end of Taylor Street is Fisherman's Wharf, famous for its seafood restaurants.

Beyond the Civic Center in the northwestern part of the city are the Presidio, Lincoln Park, and Golden Gate Park. The Presidio lies at the southern terminus of the Golden Gate Bridge, with the ocean on the west and the bay on the north. It is a United States military reservation with an area of 1,542 acres. The Spaniards established a garrison here in 1776. The original commandant's house, an adobe structure and the oldest building standing in San Francisco, was converted into a clubhouse for officers of the post. The original fortification was called Castillo de San Joaquin. In 1846 the United States flag was hoisted here, and in 1860 Fort Winfield Scott was built. The reservation includes Crissy Field, Letterman General Hospital for service men and their families, a Coast Guard station, the Marine Hospital, and a national cemetery.

Lincoln Park contains the California Palace of the Legion of Honor and the nearby marker at the western terminus of U.S. Highway 40. Beyond are Cliff House and the esplanade along the Pacific.

Golden Gate Park, three quarters of a mile wide and four miles in length, contains an abundance of cultural and recreational facilities: the Natural History Museum, the Steinhart Aquarium, the De Young Memorial Museum, the Conservatory, the Music Concourse, the Oriental Tea Garden, and Kezar Stadium.

The geographical center of San Francisco is on the east slope of Twin Peaks, which are slightly over 900 feet high. A figure-eight drive around the peaks offers a sweeping view. Nearby Mt. Davidson, in Mt. Davidson Park, is the highest point in San Francisco. On its peak is a cross, 103 feet high, at the foot of which Easter sunrise services are held.

Within the city are many interesting monuments and memorials. The Donahue Monument, commonly called the Mechanics' Monument, is a bronze representation of three workmen; it is dedicated to Peter Donahue, founder of one of the first iron works in the city. The Native Sons Monument celebrates California's admittance to the Union of States; it is a granite shaft topped by a bronze figure holding an open book with the entry "September 9, 1850." In Union Square is Victory Monument, commemorating Dewey's victory at Manila Bay. There are also memorials in metal or in stone to such famous person-

ages as Bret Harte, Robert Louis Stevenson, Junípero Serra, Sun Yat-sen, and St. Francis. The Spanish War Monument represents a mounted Victory, with a young soldier marching beside her. *The Triumph of Light,* a statue on Mt. Olympus, symbolizes the victory of light over darkness.

San Francisco Expositions.—San Francisco has been the scene of at least three important expositions. The latest and in some respects the most important was the Golden Gate International Exposition of 1939–1940. It was held on Treasure Island, a man-made island north of Yerba Buena in San Francisco Bay. The site was made by building great embankments of rock on the border of a shoal area, and then filling in with mud and sand dredged from the bottom of the bay. The island thus formed is a mile long and two thirds of a mile wide, a paved causeway joining it to Yerba Buena Island. Boat landings were built on the island. The first season of the exposition opened Feb. 18, 1939 and closed Oct. 29, 1939; total attendance was 10,496,203. Planned to celebrate the completion of the two great San Francisco bridges, the exposition scheme was broadened and became a Pageant of the Pacific. The second season of the exposition opened May 25, 1940 and closed Sept. 29, 1940; the total attendance for the two periods was 17,000,000.

The California-Mid-Winter Exposition of 1894 at Golden Gate Park was the first to be held in San Francisco. The Panama-Pacific Exposition in 1915, celebrating the opening of the Panama Canal, was also built on made land, now the Marina district of San Francisco.

History.—Until the early Portuguese, English, and Spanish explorers touched on the California coast, the San Francisco Bay area remained almost the farthest point distant on the globe in relation to civilization and known trade routes. The bay was equally remote from both European and Asiatic civilizations.

According to some historians certain ancient records of the Chinese indicate that a group of Buddhist priests, led by Hwui Shan, left Kabul (Afghanistan) in 458 A.D. and sailed along the lower reaches of the Pacific coast of North America, spending some time introducing Buddhism and the monastic system, and reforming the customs and manners of the people in the vicinity of Mexico which they termed Fusang, before returning to China in 499 A.D. But if this is true, more than 1,200 years were to pass before the events of history would span the gap between Mexico and San Francisco Bay, though today it can be spanned by air transport in 10 hours.

Meanwhile Hernando Cortés sent forth expeditions in 1532 on orders from Charles V, Holy Roman emperor and king of Spain, to seek a natural port well north of New Spain where Spanish navigators might find refuge on the long voyage from Manila to Acapulco, New Spain. But it took Spanish explorers 237 years to carry out this decree, and then it was the king's soldiers rather than his sailors who were finally to set eyes upon the great landlocked harbor behind the Golden Gate.

The first to come to the vicinity of San Francisco (Nov. 16, 1542) was a Portuguese explorer, Juan Rodrigues Cabrillo, who was recorded as discoverer of the group of islands about 27 miles westerly of San Francisco, later named the Farallon Islands. The stretch of water between the islands and the California coast he named La Bahía de los Pinos (Bay of Pines). He left Dec. 8, 1542.

Next, on June 17, 1579 (Julian calendar), Sir Francis Drake, famed English explorer, sailed into the sheltered indentation behind Point Reyes, now known as Drakes Bay, a few miles northwest of the site of San Francisco. During Drake's five-week stay, he became acquainted with the native Indians and found them friendly. He claimed the area as New Albion and set up a monument to establish the queen's title to the new kingdom, then sailed away July 23d.

On Nov. 6, 1595, Sebastian Rodrigues Cermeño, after sailing from Manila on July 5, came along the California coast near Cape Mendocino and entered Drakes Bay to which he gave the name La Bahía de San Francisco. In an attempt to explore the area more thoroughly, he constructed a smaller boat, but before it was completed his large ship was destroyed by a great storm. It is recorded that he took many soundings and became aware of the hazards of the area before he left Drakes Bay on Dec. 8, 1595.

Next Sebastián Vizcaíno visited the region in 1603, mapping the area outside the Golden Gate to the Farallon Islands as the Bahía de Puerto de San Francisco (Bay of the Port of San Francisco). The long headlands at the north end of the bay he named Punta de Los Reyes (King's Point). But there is no record that any of these explorers who journeyed by sea entered the Golden Gate.

Recorded history was to wait 166 years more before San Francisco Bay and the San Francisco Peninsula would be discovered by Gaspar de Portolá's expedition working overland up the coast in an effort to confirm the locations of both Monterey Bay and Bahía de San Francisco and establish claim to them. In the vicinity of Monterey, doubt as to where they were resulted in Portolá's directing his chief scout, Sergeant José Ortega, to proceed to check the area up to Point Reyes. During the scouting trip Ortega and his companions pushing northward, sighted on Nov. 2, 1769, from a prominence on the peninsula, an "arm of the sea," now known as San Francisco Bay. The only inhabitants encountered in the area were Indians who lived chiefly on simple food that grew wild, such as acorns, seeds, special grass, herbs, roots, and berries. There was no evidence of soil cultivation, and they had no domestic animals.

Until the ship, *San Carlos,* in command of Lieut. Juan Manuel de Ayala of the Spanish Navy, was able to sail through the Golden Gate, Aug. 5, 1775, "nothing but tule rafts of the Indians had graced the water of San Francisco Bay."

A year later, Juan Bautista de Anza arrived with colonists from Mexico and on March 28, 1776, selected a site for the Presidio, the first settlement in San Francisco. On March 29, 1776, a site for the Mission San Francisco de Asís (later called Mission Dolores) was selected. The Presidio was dedicated by Lieut. José Joaquin Moraga on September 17, and the mission was dedicated by Padre Francisco Palou on October 8. The first white baby was born at the site of Mission Dolores Aug. 10, 1776. When the Liberty Bell pealed the birth of the nation, San Francisco was a budding settlement.

Portsmouth Plaza was the cradle of the little village at Yerba Buena Cove near the waterfront, which for several decades remained an insignifi-

Nob Hill, looking toward Berkeley.

Philip Gendreau, N.Y

The Embarcadero.

SAN FRANCISCO

cant trading post frequented by rough seafarers. Yerba Buena was named after the aromatic vine which was found in the underbrush of the settlement. The first dwelling in Yerba Buena was put up by the first harbor master, Capt. William A. Richardson, an Englishman, June 25, 1835.

During 1836, Yerba Buena became an important trading post and the first commercial building, part dwelling and part warehouse, was erected for the first retail firm, owned by Jacob Primer Leese (Ohio born). On July 4, 1836, he summoned all the leading Mexican families and prominent persons to an Independence Day celebration which lasted for two days and a night. During this celebration, the Stars and Stripes was raised beside the Mexican flag for the first time in San Francisco. In the little cove, just under the southerly slopes of Telegraph Hill at Broadway and Battery, the first pile wharf was constructed in 1847.

With the conquest of California in 1846, Yerba Buena came under control of the Americans on July 9, 1846, and was soon to receive a new name. The first American alcalde, Lieut. Washington Alan Bartlett, on Jan. 30, 1847, issued an ordinance changing the name of the town to San Francisco.

Less than a year later, on Jan. 24, 1848, gold was discovered in Sutter's millrace on the American River. When the evidence reached San Francisco, the population, then about 900, started the first gold rush. Less than a dozen persons were left behind in the town. As the news spread around the world and ships came pouring in a year later, San Francisco was a cantonment of tents with a population of about 2,000. By 1850 the city boasted 25,000 inhabitants from the far corners of the earth.

As the confused settlement mushroomed, there were periodic fires and prompt rebuilding. There was lawlessness and the stern suppression by the volunteer Viligance Committee, organized on June 9, 1851. By 1854 the rich placer mines began to run out but in 1858 a new gold strike in British Columbia, along the Fraser River, caused an exodus from San Francisco of some 18,000 persons and considerably lightened the unemployment burden.

The physical rebuilding and transformation of the city into a solidly built metropolis began as the people turned to commerce and industry to supply the growing needs of the agricultural districts as well as the mining districts. It was in 1873 that the first cable cars were installed. The city grew steadily. Then came 1906—and the earthquake and fire that devastated the city. The first shock occurred at 5:16 A.M., April 18, 1906. The earthquake damaged the water system and fire broke out and raged for three days, being finally stopped by dynamiting buildings in its path. Some 500 persons were dead or missing; 25,000 buildings had been destroyed. The damage was estimated at half a billion dollars. Immediately the work of rebuilding the city was begun.

San Francisco became increasingly important as a seaport and the financial, distribution, and manufacturing headquarters for business and commerce of a vastly rich region with its greatly diversified resources. The city continued to hold this important position; following the outbreak of World War II, this area cleared more military cargo than any other port in the nation. During the height of the war shipbuilding program, the San Francisco Bay area was foremost. The San Francisco Port of Embarkation during the war in the Pacific was designated by its commanding general as "the most important port in the world," and as the war ended operated at new highs.

San Francisco was host to the delegates from the many nations assembled there from April 25 to June 26, 1945, to construct the Charter of the United Nations and to establish an international organization to be known as the United Nations.

During the war and postwar periods nearly 200,000 new residents settled in San Francisco and more than a million new residents settled around San Francisco Bay, bringing new demands and creating new opportunities in this area.

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SAN FRANCISCO BAY. A landlocked bay separated from the Pacific Ocean by the

Golden Gate channel, on the coast of California. It contains a number of islands, of which Alcatraz —formerly a fortified island, and presently the site of a Federal prison—Angel, and Yerba Buena (or Goat Island) are the largest. Including San Pablo at its northern point, the bay is 55 miles long and from three to 12 miles wide. San Pablo Bay on the north, about 10 miles wide and nearly circular in shape, is connected with Suisun Bay, about eight miles long and four miles wide, by the Straits of Carquinez. Several smaller bays furnish harbor advantages for towns on the mainland.

SAN FRANCISCO CONFERENCE. See PACTS AND CONFERENCES: WORLD WAR II.

SAN FRANCISCO PANAMA-PACIFIC EXPOSITION. Held to celebrate the opening of the Panama Canal and the quarter-centenary of the discovery of the Pacific this exhibition was opened at San Francisco Feb. 6, 1915 by President Woodrow Wilson, who pressed a button that swung open the doors and set the mechanical exhibits in motion. In March 1911 Congress selected San Francisco as the site for the exposition and Oct. 14, 1911 President Taft turned the first shovelful of dirt on the chosen site. The location fronted on San Francisco Bay for nearly 2½ miles and its average depth was about half a mile, giving it an area of 625 acres. Forty-two foreign countries and 43 states contributed approximately 80,000 exhibits. About 400,000 persons visited the grounds on the opening day. The total attendance was 18,756,148; the total receipts $12,525,088—$4,715,523 from admission fees; $7,809,565 from concessions. California, San Francisco, private corporations and individuals subscribed $20,000,000 to finance the enterprise.

SAN FRANCISCO PEAKS (also SAN FRANCISCO MOUNTAIN), a conical mass with area of about 40 square miles rising about 5,000 feet above the Arizona Plateau, a few miles north of Flagstaff, Coconino County, Arizona. Its two highest summits are San Francisco Peak, 12,611 feet and Agassiz Peak, 12,340 feet. The mountain consists of moderately old lavas and breccias, the products of five distinct stages of eruption. The old vent is near the center and the top has been somewhat lowered by erosion. It is estimated that the lava outflows had a volume of 38 cubic miles and they piled up as a viscous mass on a platform of Kaibab limestone, constituting the general plateau. The mountains are partly covered with pine woods. From the top there is a wonderful view of Grand Canyon to north, Painted Desert and Hopi Buttes to east and many recent cinder cones and lava flows on all sides

SAN GABRIEL, săn gā′brĭ-ĕl, city, California, in Los Angeles County; altitude 429 feet; south of the San Gabriel Mountains in the Angeles National Forest; 9 miles east of Los Angeles; on the Southern Pacific Railway. San Gabriel is a residential city and a readily accessible suburb of Los Angeles, located in a rich fruit and vegetable growing district that has likewise important poultry interests; is a retail center and has numerous small manufactures, together with many feed grinding and mixing plants. The city has excellent school and library facilities, and is famous for the Mission San Gabriel Archangel, built in 1771. Until well into the 19th century the mission was the first point of civilization west of the desert; and it was from its portals that the Spanish governor, Felipe de Neve, set out in 1781 to found the pueblo that later became the great city of Los Angeles. San Gabriel Mission, now a parish church, has a mission high school, and a parochial elementary school. The visitor will find some of the finest mission architecture in San Gabriel. There is a baptismal font, statues and paintings brought from Spain in early times. There are a number of adobe houses. San Gabriel received its city charter in 1913. Pop. (1940) 11,867; (1950) 20,343.

SAN GERMAN, săng hĕr-män′, town, Puerto Rico, located near the southwestern coast, near Mayaguez. One of the oldest towns on the island, it was settled in 1511. In the regions around it, sugar, coffee, tobacco, and a variety of fruits grow. It has one of the oldest Catholic churches on the island. It is the site of Polytechnic Institute, operated by American Protestants, and a center of both collegiate and vocational studies. Pop. (1948) 8,872.

SAN GERMANO, Italy. See CASSINO.

SAN GIMIGNANO, sän′ jē-mē-nyä′nō, city, Italy, in the province of Siena. About 18 miles northwest of Siena, San Gimignano, the "city of beautiful towers," named for a 4th century bishop of Modena, is finely situated on a height about three miles from the left bank of the Elsa, a tributary of the Arno. Its medieval aspect is virtually unaltered, the town walls, palaces and towers recalling the 13th and 14th centuries. In consequence of a violent struggle between its two chief families, the Ardinghelli and the Salvucci, it submitted to the republic of Florence which, in 1354, incorporated it with surrounding districts, and to better maintain control built the castle of Montestaffoli, completed in 1358. One of the most interesting of the smaller Tuscan centers, it is a mecca of art lovers. Its 12th century collegiate church and the church of St. Augustine contain frescoes by Benozzo Gozzoli. During World War II it was severely damaged by air bombing, but repairs have been made. Pop. (1950 est.) 3,800.

SAN ILDEFONSO, ēl-dā-fŏn′sō, or **LA GRANJA, Treaties of,** two secret agreements between France and Spain, both extremely disadvantageous to Spain. (1) Arranged in 1796, while France was at war with England, pledged the two countries to support each other in time of war with 25 ships and 24,000 troops, of which 6,000 were to be cavalry; an agreement which at once involved Spain in the war then in progress and for which she was severely punished by England. (2) Concluded Oct. 1, 1800 and ratified Oct. 30, 1800, by which Spain receded to France the territory of Louisiana, with the understanding that the territory was not to be sold by France except to Spain; in return for which Napoleon agreed to make the Duke of Parma king, adding either Tuscany or the Roman legations to his territory, so that the population of his kingdom should be above a million. Napoleon, however, disregarded the treaty and sold Louisiana to the United States without consulting Spain.

SAN ISIDRO, sän′ē-se′thrō, town, Philippine Islands, capital of the Province of Nueva

Ecija, Luzon on the Grande de la Pampanga River, 48 miles north of Manila. It is a well-built town, at the intersection of several main highways which connect it with Manila, with several points on the Manila and Dagupan Railroad and with other important towns. It is in a fertile agricultural region and has a considerable trade in rice and corn. Pop. (1939) 2,192.

SAN JACINTO, Battle of, final battle of the war between Texas and Mexico which gained for the former her independence. The battle took place April 21, 1836, on the banks of the San Jacinto River, about 20 miles from the present city of Houston, and resulted in the overwhelming defeat of 1,600 Mexicans under Santa Anna by 783 Texans under Gen. Sam Houston. The Mexican casualties were: 630 killed, 200 wounded, 730 taken prisoners; the Texan casualties were: seven killed, four mortally wounded. A magnificent monument, 570 feet four inches high, marks the place where the battle was fought. It was dedicated Apr. 21, 1937.

SAN JOAQUIN, a river of California which has its rise in a small glacier southeast of the Yosemite Valley, near Mount Lyell, on the east slope of the Sierra Nevada. It flows southwest about 100 miles; then in Fresno County it changes its course to a northwest direction to its confluence with the Sacramento River; then flows west into Suisun Bay. In Fresno County it receives the waters of Tulare system of lakes through King's River, after which it passes through the Sanjon, or Big Salt, Slough. It is about 350 miles long, and is navigable for 50 miles to Stockton all the year, and in winter and spring about 200 miles farther.

SAN JOSE, hō-sā′ ctiy, California, and Santa Clara County seat; altitude 100 feet; in the Santa Clara Valley; 40 miles southeast of San Francisco, 7 miles from the southern tip of San Francisco Bay; on the Southern Pacific and Western Pacific railroads. San Jose and Santa Clara to the northwest are one continuous community; between the two runs The Alameda, a boulevard with triple rows of willows and sycamores. The county has over 64,000 acres given over to the raising of prunes (first grown here in 1856) and more than 20,000 acres in apricots, as well as extensive areas planted in grapes, pears, walnuts and cherries. The city is thus a shipping point for fresh, canned and dried fruit and headquarters for the cooperative California Prune and Apricot Growers Association. Here are plants for making fruit and fish cans, canning and packing machinery, and labels for food and other products.

Several types of wine are bottled here, including champagne. There are railroad repair shops and foundries, and other industries are concerned with spray chemicals (the spray gun was invented here in 1883), cement, oil well supplies, pumps, pottery, ladders and playground equipment, meat packing, lumber, boatbuilding and breweries. Near San Jose is located America's greatest cement plant, Permanente Corporation, at Monte Vista, which employs over 1,000 persons. Because of the success of the Permanente management, the National Defense Commission approved an allocation of $21,000,000 for the erection of a gigantic magnesium plant near the cement plant site. The output of this plant will treble the total United States production of magnesium.

Santa Clara County is known as the "Valley of Heart's Delight." The Municipal Rose Garden (five and a half acres, opened in 1931) has roses of many varieties blooming throughout the year; in May more than 100,000 bushes are in flower. City Hall Park has a Civic Auditorium (1936), seating 3,300. Montgomery Theater and Dunne Hall are used by little theater groups. Rosicrucian Park, American headquarters of the AMORC (Ancient Mystic Order of the Rosae Crucis), has a planetarium, Egyptian Temple and Oriental Museum. The poet Edwin Markham lived in San Jose, 1857–1899; his home is now a part of his alma mater, San Jose State College (1857; moved here from San Francisco in 1871). It has a 26-acre campus in Washington Park. Alum Rock Park (716 acres), 6 miles east, belongs to the city and has 22 mineral springs, sulphur baths, bridle paths and strange rock formations. Mount Hamilton Road leads to Lick Observatory, 25 miles east, a department of the University of California. At Moffett Field Airport, 9 miles northwest, near Sunnyvale, is the U.S. Ames Aeronautical Research Laboratory. In San Jose is Bellarmine College Preparatory School, and in Santa Clara the University of Santa Clara.

San Jose was founded in 1777, as was the Mission Santa Clara, and the mission San José in 1797. In 1846 the territory came under the flag of the United States, and in 1849–1851 San Jose was the capital of California. It was the first city in the state to be chartered, in 1850. Fruit growing then began to replace cattle raising as the major industrial activity. Dried prunes were first shipped out of the state in 1867. Peaches and pears were first canned commercially in 1871; and in 1875 the first iced shipment of fresh fruit was made from this valley.

A morning paper, *Mercury-Herald* (1851), has a Sunday edition; the *Evening News* dates from 1883. Radio station KQW began experiments here in 1909, was licensed and had entertainment programs in 1912, and in 1915 broadcast music to the Panama-Pacific Exposition in San Francisco.

In 1916 the council-manager form of government was adopted. Pop. (1950) 95,280.

SAN JOSE, city, Costa Rica, capital of the republic and of San José Province, on an elevated plateau 4,500 feet above sea level, about 15 miles northwest of Cartago (the ancient capital), with which it is connected by rail; on the Inter-American Highway. It is in a rich agricultural district and is a center of commerce, on the Pacific and the Costa Rica railways. The most conspicuous buildings are the palaces of the president, and the bishop and the National Palace; the University, to which is attached a medical school and a museum; the restored cathedral, and the National Theatre, a monument of artistic beauty, containing Italian marbles, pillars, columns, statues, and frescoes, and in its elaborate decorations resembling the Library of Congress at Washington. It cost almost $1,000,000. There is a good school system and the city is progressive. The merchants are mostly foreigners. The railroads, banks and electric-light plants were largely built by English capital. Coffee is the principal product. San José is a popular health resort. Pop. (1950) 86,909.

SAN JOSE, săn (h)ō-zā′, or **PUERTO SAN JOSE**, town, Guatemala, in Esquintla Department, is the chief Guatemalan port on the Pacific, and is also a rail terminus and tourist resort, 26 miles south of Esquintla. The principal exports are coffee, sugar, and lumber. Pop. (1950) 2,683.

SAN JOSE, town and municipality, Republic of the Philippines, in Nueva Ecija Province, central Luzon, 20 miles north of Cabanatuan, is a rail terminus and agricultural center. The chief crops are rice and corn. Pop. (1948) town, 10,544; municipality, 33,017.

SAN JOSE, department, Uruguay, on the Rio de la Plata; area 2,668 square miles. The rolling plains with rich soil and abundant water are favorable to stock raising and the growing of wheat, corn, flour, and fruit.

The department was set up in 1816 as a much larger territory. It included the present departments of Florida and Flores which were separated in 1856 and 1885 respectively. San José is the capital and chief city. Pop. (1953 est.) 98,627.

SAN JOSE, city, Uruguay, capital of San José Department, is situated on the right bank of the San José River, 50 miles northwest of Montevideo, on the railroad linking Montevideo with Mercedes. It is a center of the cattle and grain trade and also has flour mills. Founded in 1783 by 46 families from La Coruna, Spain, it became the provisional capital of Uruguay during the anti-Brazilian uprising of 1825–1826 led by Juan Antonio Lavalleja and 32 other patriots, sometimes called the revolt of the 33. (See URUGUAY—*History*.) Dominating the main plaza of the city is one of the largest churches in Uruguay, a structure in the Renaissance style with two bell towers and a cupola. Pop. (1953 est.) 25,000.

SAN JOSE, island and military base, Panama, in Panama Province, is one of the Pearl Islands in the Gulf of Panama. It has an area of about 25 square miles. Since World War II it has been used by the United States as a military base.

SAN JOSE DE BUENAVISTA, săn (h)ō-zā′ dĕ bwā-nä-vĭs′tä, town and municipality, Republic of the Philippines, on Panay Island, capital of Antique Province, is located 40 miles northwest of Iloilo, on Cuyo East Pass. It is a rice-growing and copper-mining center, exporting copper, copra, rice, and sugar. Pop. (1948) town, 5,159; municipality, 34,639.

SAN JOSE DE CUCUTA. See CUCUTA.

SAN JOSE STATE COLLEGE, San Jose, Calif., founded in 1862, is the oldest state-owned public educational institution in California. The first building was a large frame structure of native redwood. When this burned during the 1870's, a four story brick building was erected. Since that time, many buildings have been added, several in the California mission style. The Health Home, or college infirmary, a simple old-fashioned redwood house, was once the home of the poet Edwin Markham, a graduate of the college. *The Man With the Hoe* (1899) was written here. The average yearly student enrollment is 7,000.

SAN JUAN, säng hwän′, province, Argentina, bounded on the north and east by La Rioja Province, on the south by San Luis and Mendoza provinces, and west by the Andes along the Chilean border; area 34,910 square miles. It is mountainous, with fertile, irrigated valleys, drained by the San Juan and Bermejo rivers. The valleys have a dry, Mediterranean climate, and raise wheat, corn, wine, alfalfa, fruit, olives, apples, bees, cattle, horses, sheep, and goats. Industries are lumbering, mining, flour milling, meat packing, wine making, alcohol distilling, dairying, brewing, and food canning. Mineral resources include lime, iron, manganese, aluminum, lead, silver, mica, asbestos, graphite, copper, molybdenum, and tungsten, though they have not been extensively exploited. The capital and chief city is San Juan (q.v.). Pop. (1947) 261,229.

SAN JUAN, city, Argentina, capital of San Juan Province, is on the San Juan River, 600 miles northwest of Buenos Aires; altitude 2,100 feet. It is the rail, industrial, commercial, and educational center for an important viticulture area, and has local trade with Chile, dealing in wine, frozen meat, dairy products, dried fruit, canned foods, machinery, cement, and timber. It has a national college with the mining faculty of Cuyo University, an agricultural school, a seismographic station, historical museum, and administrative buildings. The Sarmiento Library is housed in the birthplace of the famous statesman Domingo Faustino Sarmiento. The city was founded in 1562 by Juan Jufré y Mallea, and was originally called San Juan de la Frontera because of its situation on the Indian frontier. It became a Roman Catholic bishopric in 1834 and an archbishopric in 1934; in 1944 it suffered severe earthquake damage. Pop. (1947) 81,747.

SAN JUAN, capital city, Puerto Rico. The old city, situated on two rocky islets off the northeastern coast, is connected by a causeway and bridges with a residential section, Santurce, on the mainland. In 1951, the adjoining city of Rio Piedras was merged with San Juan.

Founded in 1521 by Ponce de León after he abandoned his first settlement at Caparra four miles to the south, San Juan was often attacked by British, French, and Dutch. (See PUERTO RICO—*History*.) By the 17th century, San Juan was one of the most secure strongholds in the Americas, never captured except when George Clifford, Earl of Cumberland, took it from a garrison weakened by disease in 1598. Clifford was forced to relinquish his prize because his own soldiers became sick.

The city contains many architectural remnants of early colonial times. La Fortaleza was built as a fort, but condemned as such by a Spanish governor, who said that "only blind men would have chosen such a place for a fort." It was partially burned by the Dutch in 1625 and rebuilt in 1639 very much as it remains today. It serves as office and residence of the governor of Puerto Rico. The Cathedral of San Juan Bautista was built between 1542 and the 19th century, with several reconstructions made necessary by earthquake, hurricane, and fire during the Dutch invasion. San José Church, completed in 1528, is considered the oldest church in the Western Hemisphere in continuous use. It was damaged by the bombardment of Admiral Sampson's fleet during the Spanish-American War. The Castillo del Morro (Morro Castle), overlooking the Atlantic at the northwest tip of the city, is a gigantic and complicated series of fortifications begun in 1540 and completed in 1606. Its walls exhibit scars from Admiral Sampson's shelling. In

addition there are a large number of old colonial mansions with arcaded patios and wide staircases, many paved with rare Spanish tiles.

Modern San Juan shows both the effects of extreme poverty and of energetic efforts to acquire what many Puerto Ricans somewhat wistfully call an American standard of living. Particularly since the 1930's, slums have been a serious problem in San Juan. Villages of shacks have sprung up in areas of wasteland and swamp, often raised on posts above the tide. It is not unusual to find flimsy structures of tin cans and debris nestled incongruously in wild water lilies and hibiscus. One such slum is cynically named La Perla (The Pearl), others—realistically—Salsipuedes (Try-and-get-out) and El Fanguito (Little Mudhole). The city and the commonwealth government have attempted to remove these slums by moving people into housing projects and by supplying trucks to transport the shacks to free land. Under another plan, the government buys lots for an average of $700 each for the relocation of tenants who get use rights in return for labor, such as building roads, water lines, sanitation facilities, schools, and churches. Rehabilitation centers have been opened for San Juan beggars. In contrast, new suburbs have grown since World War II, with hotels,

Photograph by Hamilton Wright

Bird's-eye view of San Juan, Puerto Rico.

apartment houses, and private homes in both contemporary design and in the traditional Spanish style.

San Juan contains about 20 per cent of Puerto Rico's population in 47 square miles, and 43 per cent of the island's $400,000,000 property tax is levied here. Consequently, the effects of the government's "Operation Bootstrap," an effort to industrialize and diversify the island's economy, is especially apparent here. Businesses that have expanded San Juan since 1948 include garment manufacturing, plastics, electronic appliances and equipment, textiles, machine tools, shoes, chemicals, drugs, publishing, jewelry, asphalt products, and food distribution. These firms have been attracted by the government's program of granting comprehensive tax exemptions to new industries, a program which was extended and expanded under the Industrial Incentive Act of 1954.

Shipping facilities as well as an abundant supply of labor and tax exemptions have also attracted new business. San Juan harbor, a large and almost land-locked bay, is one of the best in the West Indies. Ocean freight to ports in continental United States is cheap as compared with rail and road transport. In 1955, the $23 million San Juan Port Project was in progress: diverting a river; making new land; and building a marine terminal, transit sheds, new berths, market buildings, grain elevator, meat packing plant, and feed mill. San Juan handles more than two thirds of the 4 million short tons of cargo handled by all twelve of Puerto Rico's ports. Since Puerto Rico is part of the United States, freight to continental United States must be transported in United States ships. San Juan has the busiest airport in the Caribbean, with about 80 flights a day carrying more than 1,300 passengers. A new airport was completed in 1955.

San Juan is the financial center of Puerto Rico and for many businesses through the whole Caribbean area. The Federal Deposit Insurance Corporation insures all accounts of three local and two New York banks. The city is governed by a board of 13 commissioners, 7 chosen by direct election and 6 appointed by the governor. This board chooses a city manager, whom it is pledged to choose before elections. Schools are organized like those in the United States. Classes are conducted in Spanish. Pop. (1950, including the former city of Rio Piedras) 357,205.

SAN JUAN, săn wŏn′, city, Texas, in Hidalgo County, in the lower Rio Grande Valley, 220 miles south of San Antonio, on the Missouri Pacific Railroad. Pop. (1950) 3,407.

SAN JUAN, säng hwän′, river, Central America, part of the boundary between Nicaragua and Costa Rica. The outlet of Lake Nicaragua, it flows southeast for 120 miles into the Caribbean Sea.

SAN JUAN, săn wŏn′, river, United States. Rising in the San Juan Mountains, southwestern Colorado, it flows south and west for about 400 miles through northwestern New Mexico and southeastern Utah to join the Colorado River near Rainbow Bridge National Monument. It irrigates areas of these three states.

SAN JUAN BAUTISTA. See VILLAHERMOSA.

SAN JUAN BOUNDARY DISPUTE, in the history of Great Britain and the United States a controversy over the possession of the San Juan Islands in Puget Sound. The British-American treaty of 1846 fixed the boundary between western United States and Canada at 49° north latitude to the middle of the channel separating Vancouver Island from the mainland. But the treaty was vague as to the precise channel. The United States claimed it was Haro Strait. Great Britain claimed it was Rosario Strait. Consequently, both claimed the San Juan Islands, which lie between.

The so-called "Pig War" ensued. Local authorities of both nationalities attempted to collect taxes and customs in the disputed territory. The height of hostilities was reached in 1859, when a pig belonging to Charles J. Griffin, an Englishman, raided the vegetable garden of Lyman A. Cutler, an American. Cutler shot the pig. Troops of both countries rushed to protect national interests. The 9th Infantry, the United States force on the islands, was commanded by Captain George Pickett, who later led the famous charge at Gettysburg.

Cooling off during the period of arbitration, British and American soldiers vied in the exchange of parties and banquets. In 1872, Emperor William I of Germany, as arbiter, awarded the islands to the United States.

SAN JUAN CAPISTRANO, săn wŏn kä-pē-strä′nō, village and mission, California, 60 miles south of Los Angeles. The village grew up around the mission in the late 18th century and once declared war on Mexico because of harsh treatment of Indians by Mexican officials. Pop. (1950) 758.

The mission was dedicated by Father Junípero Serra in 1776 and named for St. John of Capistrano, the Crusader. Construction was completed in 1806. Built in the form of a cross 180 by 90 feet, the church was once one of the highest triumphs of California mission architecture, with seven domes and a tall campanario or belfry that could be seen for 10 miles. But it was used only six years before an earthquake wrecked the roof, cloisters, nave, five domes, and campanario—killing 29 persons. An attempt to rebuild with adobe in 1865 was thwarted by heavy rain.

The "Capistrano swallows" are said to have nested in the ruins since Spanish colonial times, leaving the mission on every St. John's Day, October 23 (the death day, not the feast day), and returning on every St. Joseph's Day, March 19. It is reported that they have been late only once, delayed four hours by a storm at sea.

A number of legends are woven about Capistrano—involving a dark-robed Franciscan ghost, bells that toll in spite of motionless bell ropes, and an Indian girl novice dying with the reverberations.

The cloister of San Juan Capistrano Mission.

SAN JUAN DE LA MAGUANA, säng hwän′ dā lä mä-gwä′nä, city, Dominican Republic, since 1938 capital of Benefactor Province, is located 90 miles northwest of Ciudad Trujillo, in the valley of the San Juan River, in the western mountains. It is on a highway and has an airfield. The soil is fertile, producing rice, coffee, corn, and fruit, and more irrigation would increase its productivity. Pop. (1950) 10,093.

SAN JUAN DE LOS MORROS, dā-lōz mō′rōs, town, Venezuela, capital of Guarico State, 50 miles southwest of Caracas, on the highway to Ciudad Bolívar, is a health resort with warm sulphur springs patronized by Venezuelans. Its chief commercial resource is natural gas from which krypton, helium, argon, and neon are derived. Pop. (1950) 13,580.

SAN JUAN DE ULUA, dā ōō-lōō′ä, or **SAN JUAN DE ULLOA,** 17th century fortress, Mexico, on the small island in Veracruz Harbor where Hernán Cortés landed in 1519. The fortress was the last Mexican stronghold held by the Spanish before their expulsion in 1821.

SAN JUAN DEL NORTE, děl nôr′tā (formerly GREYTOWN), town, Nicaragua, in Rio San Juan Department, at the northern mouth of the San Juan River, on the Caribbean seacoast, about 75 miles south of Bluefields. It exports small amounts of bananas, coconuts, hardwood, rubber, and tortoise shell. The British occupied it in 1848 to forestall the building of a canal across Nicaragua by the United States. (See CLAYTON-BULWER TREATY.) During the mid-19th century gold rush days it was a transfer point and trading center on the sea route to California. In reprisal for an attack by a Nicaraguan mob on the United States legation in 1854, the town was bombarded by the sloop of war *Cyane* commanded by George N. Collins. In November 1857, William Walker (q.v.) landed here on a filibustering expedition. Pop. (1950) 307.

SAN JUAN DEL RIO, děl rē′ō, city, Mexico, in Querétaro State, on the central plateau, is 79 miles southeast of Querétaro, on a railroad; altitude 6,243 feet. Famous for its opals mined at nearby La Trinidad, it is also a mining center for silver, lead, and copper, and an agricultural market center for wheat, corn, alfalfa, sugar cane, beans, fruit, and livestock. Pop. (1950) 7,507.

SAN JUAN DEL SUR, sōōr′, town, Nicaragua, in Rivas Department, 14 miles south of Rivas with railway connection, is a seaside resort and port on the Pacific, exporting coffee, sugar, and lumber. During the 1849 California gold rush it was the Pacific terminus of the transisthmian route to the gold fields. It has

submarine cable connection with Mexico and Panama, and is a station for regular steamers. Pop. (1950) 1,019.

SAN JUAN HILL, Battle of. See SANTIAGO DE CUBA.

SAN JUAN ISLANDS, a group belonging to the State of Washington. They begin in the Strait of Georgia and extend south into Puget Sound. The largest islands of the group are San Juan, Oreas, Lopez and Shaw. In 1850 these islands were claimed by both the United States and Great Britain, and both American and British garrisons were stationed on them. See also SAN JUAN QUESTION.

SAN JUAN MOUNTAINS, the southern part of the western range of the Rocky Mountains in southwestern Colorado, mostly in San Juan, San Miguel, Mineral, Hinsdale, Archuleta, Rio Grande and Conejos counties. It is about 100 miles long from northwest to southeast. Many of its peaks are more than 13,000 feet above sea level. Mount Wilson 14,250 feet high being the highest.

SAN JUAN QUESTION, in American history an early boundary line dispute between the United States and Great Britain. In negotiating the treaty of 1846, by which the 49th parallel, from the Rocky Mountains to the sea, was made the boundary, a controversy arose concerning the course of the line through the channel which divides Vancouver Island from the mainland. The Americans contended for the Canal de Haro, the British for the Rosario Strait. To avoid conflict, it was decided that both nations occupy the island of San Juan at opposite ends. In 1872 Emperor Wilhelm I of Germany, acting as arbitrator, decided for the United States.

SAN LEANDRO, săn lē-ăn′drō, city, California, in Alameda County; altitude 48 feet; adjoining Oakland on the south; on the Southern Pacific, and the Western Pacific railroads. A residential and industrial city, its manufactures include air conditioning and mechanical draft equipment, aircraft supplies, and automobile parts. It is an important horticultural center. Settled in 1836, it was incorporated in 1872. Government is by council-city manager. Pop. (1950) 27,542.

SAN LUCAR DE BARRAMEDA, săn lo͞o′kär thä vär-rä-mä′thä, city, Spain, a seaport in the Province of Cádiz, Andalusia, at the mouth of the Guadalquiver, 17 miles north of Cádiz. The most conspicuous buildings are several convents and the palace of the duc de Montpensier, containing valuable art treasures; the ruins of a Moorish castle; churches; townhouse; and the St. George Hospital, which dates from 1517. There are good schools, usually directed by religious orders. The chief occupations of the inhabitants are fishing and viticulture. Olives, tropical fruits, and vegetables are grown, and there is considerable trade in sherry wines. The chief imports are coal from England; sulphur and vegetables from France; exports are salt, wine, fruit, and oats. Columbus embarked from this point on his third voyage, and Magellan on his voyage of 1519. Pop. (1940) 28,446.

SAN LUCAS, săn lo͞o′kăs, **Cape,** the southern extremity of the peninsula of Lower California, Mexico.

SAN LUIS, săn lwēs′, province and city, Argentina. (1) The province is situated in the central west of the republic, with an area of 28,520 square miles. At the northeast terminates the Sierra de Córdoba; through the northeast extends the Sierra de San Luis rich in copper and precious metals, which are, however, little exploited. In the south extend salty pampas. The climate is dry and healthful, marked by great extremes. The rivers include the Rio Quinto, Conlara, and Pampa de las Salinas; transportation facilities are poor, and there is little industry. Until 1776 it was part of Chile, from which date, together with the modern provinces of Mendoza and San Juan, it comprised the vast Cuyo region until 1820, and became a separate province in 1832. Pop. (1947) 165,546.

(2) Capital of the province of San Luis, at the southern extremity of the Sierra de San Luis, on the Chorrillo, 480 miles northwest of Buenos Aires on the transcontinental railway. It has a national college, normal and primary schools, and a branch bank. Nearby are the Potrero de Funes irrigation dam and hydroelectric station. The chief industries are sawmills, flour mills, and plaster factories. Founded in 1596 by Martín de Loyola, governor of Chile, it was formerly called San Luis de la Punta. Pop. (1947) 26,152.

SAN LUIS OBISPO, săn lo͞o′ĭs ō-bĭs′pō, city, California, and San Luis Obispo County seat; altitude 201 feet; on the Southern Pacific Railroad; and Pacific Coast Railway, 8 miles from Port San Luis on San Luis Obispo Bay, an arm of the Pacific Ocean; and midway between San Francisco and Los Angeles. It is in an agricultural region. The industries are chiefly connected with farm and dairy products; the cultivation and shipping of fruits and nuts; manufacture of brick and tile; development of chromite deposits; and the transportation and refining of oil. California State Polytechnic College is here. The town grew up around the mission established here by Fray Junípero Serra in 1772. It became a pueblo in 1844 and was incorporated as a city in 1856. Pop. (1950) 14,180.

SAN LUIS POTOSI, pō-tō-sē′, an inland state, north central Mexico. Its surface consists almost entirely of a plateau, some 6,000 feet in altitude, occasionally broken by ridges. The upland climate is moderate and the soil fertile, but an inadequate rainfall generally confines agriculture to irrigated areas. The southeastern section, however, separated from the plateau by the Sierra Madre Oriental, is a semitropical area with elevations of less than 1,000 feet where coffee, sugar, tobacco, fiber plants and tropical fruit are grown. In this region is the state's only important river, the Pánuco, which with numerous confluent streams, flows eastward out of the mountains to empty into the Gulf of Mexico at Tampico. Considerable numbers of livestock are raised in the state, and hides, tallow and wool are exported. The rubber-producing guayule is a crop of increasing importance. Mining, however, is the leading activity, being concentrated on the plateau, between the Catorce district, where mines have been worked since the 1770's, and the capital city of San Luis Potosí, where there are large processing plants. Silver, lead, gold, copper,

mercury, and cinnabar are the principal ores mined. The area of the state is 24,417 square miles. Pop. (1950) 855,336.

SAN LUIS POTOSI, city, Mexico, capital of the State of San Luis Potosí and an important mining center. It is situated 225 miles northwest of Mexico City in an arid region at an elevation of some 6,100 feet, which gives it a moderate climate. Many of the buildings, including the governor's palace and the Church of El Carmen, an example of extreme baroque, are constructed of a distinctive rose-colored stone, and the city's many domes and towers are covered in blue and white, or multi-colored, glazed tile. The region was one which the Aztecs had not conquered before the arrival of the Spaniards. These latter at first overlooked the riches of the area and merely erected here a series of strongholds to protect their lines of communication with Zacatecas where miners were active.

San Luis Potosí was founded about 1550, being named for King Louis IX of France (St. Louis); the "Potosí" was later added in allusion to the great mines in Bolivia whose name had become a synonym for fabulous wealth. The discovery of gold precipitated a rush in 1590, but operations were badly conducted, and for some 30 years after 1620 the town was almost completely abandoned in the belief that the mineral wealth of the surrounding region was exhausted. Further discoveries, particularly of silver, subsequently restored its prosperity. During the internal struggle against Maximilian, the city was for a time the provisional capital of the government of Benito Juárez. The so-called Plan of San Luis, opposing oppressive measures of the government of Porfirio Díaz and demanding reforms, which kindled the revolution of 1910, is given this title because it was drawn up in this city. Mining and the processing of ores is the greatest local industry; there are also cotton and woolen manufactures, breweries, and flour mills. A major rail and highway center, the most important communication link is with the port of Tampico, 200 miles to the east, on the Gulf of Mexico. Pop. (1950) 126,596.

SAN MARCOS, săn mär'kŭs, town, Texas, and Hays County seat; altitude 581 feet; on the San Marcos River; 30 miles southwest of Austin; on the Missouri Pacific; and Missouri, Kansas and Texas railroads. It is in an agricultural region, cotton, corn, and livestock being the chief products. It has a meat packing plant, a green feed dehydrating plant, cotton mills and processing plants, and federal and state fish hatcheries. Settled in 1845, it became the county seat upon the organization of the county in 1848, deriving its name from the older settlement of San Marcos de Neve, founded at the Camino Real river crossing in 1808 and abandoned in 1812. There is a monument to Gen. Edward Burleson, one of the founders of the town. The river furnishes a steady flow of clear, cold water, and there are many parks and caves along its banks. These natural attractions have made the town a popular pleasure resort. There are also hot springs within the town limits. Southwest Texas State Teachers College here includes a 40-acre demonstration farm specializing in dairying and poultry raising. There is also an Air Force base. Government is administered by a commission. Pop. (1950) 9,980.

SAN MARINO, săn mâ-rē'nō, city, California, in Los Angeles County, just southeast of Pasadena, altitude 567 feet; on the Pacific Electric Railway. Settled about 1852 and incorporated in 1913, it is a fashionable residential suburb and seat of the internationally known Huntington Library and Art Gallery. Government is by city council and mayor. Pop. (1950) 11,230.

SAN MARINO, sän mä-rē'nô, Europe, the smallest republic in the world and claiming to be the oldest state in Europe, comprises an area of 23 square miles, enclosed by Italian territory, among the terminating spurs of the Apennines near the Adriatic Coast. The government is peculiar and eminently democratic; its legislative power is vested in a Great Council of 60 members elected by popular vote, two of whom are appointed every six months to act as regents and a smaller Council of 12 members, divided into four congresses or departments. The executive authority is exercised by the regents. There is no public debt.

The town, standing on a mountainous crag 2,420 feet high, was built round a hermitage dating from 441 and is surrounded by a great wall with forts. But one road enters the town. Borgo is an aristocratic suburb at the foot of the hill. Silk is the principal manufacture. There are numerous massive and stately buildings including the governor's palace and six churches, one of which contains the tomb and statue of St. Marino; besides several schools, a museum, theater, town hall, and convents. Agriculture is the chief pursuit. Pop. (1936) 13,948.

SAN MARINO, Order of. See ORDERS AND DECORATIONS—*San Marino.*

SAN MARTIN, mär-tēn', **José de,** Argentine general and liberator: b. Yapeyú (now San Martín, Corrientes Province), Argentina, Feb. 25, 1778; d. Boulogne-sur-Mer, France, Aug. 17, 1850. Called the "Liberator of the South," he shares with Bolívar the glory of having expelled the Spanish power from continental South America. The son of a prominent Spanish official, at the age of nine he was sent to Madrid to obtain a military education. Commissioned second lieutenant in 1793, he rose through the grades to lieutenant colonel in 1808. He participated with distinction in campaigns on the Portuguese frontier, in Africa, and finally in the fighting that ensued on the Napoleonic invasion of the peninsula. In 1812, on the eve of his promotion to a colonelcy, he resigned his commission and embarked for his native land where he tendered his services to the revolutionary government.

On Feb. 3, 1813, San Martín attacked and defeated the Spanish forces under Gen. José Zavala at San Lorenzo on the Paraná. A year later (January 1814), finally promoted general, he superseded Gen. Manuel Belgrano (q.v.), in command of the Army of Upper Peru which had been nearly destroyed the previous autumn on the Bolivian plateau in the shattering defeats of Vilapugio and Ayohuma. Toward the end of the year he resigned this command and had himself appointed military governor of the region of Cuyo (now comprising the Argentine provinces of Mendoza, San Juan and San Luis) with headquarters at the city of Mendoza. Here he matured his great plan which was essentially to strike at the heart of the Spanish power in its

Peruvian citadel—not directly, as Belgrano had vainly attempted, but by first invading Chile and thence advancing northward by sea to Peru.

Toward the end of 1816 all was prepared for the campaign, but it was not until January 1817 that he set out from Mendoza at the head of a seasoned army of 4,000 men on the 17-day march across the Andes, traversing the Uspallata Pass. At Chacabuco, on February 12, he routed the hastily assembled Spanish forces. Then dividing his army he sent a part to destroy the Spanish nuclei in southern Chile and himself, heading the main body, invaded the central and northern areas. On March 17, 1818 he occupied Santiago, but two days later was badly defeated at Cancha Rayada. However, his decisive victory at the Maipo River on April 5 not only retrieved his fortunes but proved the death blow to the Spanish power in Chile.

Having declined the presidency of the liberated country in favor of Bernardo O'Higgins (q.v.), one of his chief lieutenants who had contributed importantly to the victory of Chacabuco, he now prepared the second phase of his plan, the construction of a fleet capable of dominating the Pacific and of convoying his army to Peru. On Aug. 23, 1820 he set sail from Valparaiso with an army of 4,500. Debarking at Parascas on September 8, he occupied the littoral as far as Pisco, some 150 miles south of Lima, the capital. Minor victories culminated in the battle of Pisco (December 6) in which the Spanish general and most of his artillery were captured. At the Conference of Puchanca (June 2, 1821) the new viceroy, J. de Salerna, offered terms which San Martín rejected, as they did not concede absolute independence. Resuming his advance, he occupied Lima on July 9. On the 28th he proclaimed Peru's independence and assumed the title of Protector. He expelled the majority of Spanish citizens, reformed the inhuman system of Indian labor exploitation, abolished slavery and initiated a system of annual redemptions of quotas of living slaves. He also founded the national library and instituted the Order of the Sun.

His celebrated meeting with Gen. Simón Bolívar at Guyaquil on July 26, 1822, a secret conference of the two liberators, has ever since been a theme of speculation. Hardly had the first Peruvian parliament assembled at Lima on September 20 than he resigned his protectorship and military command, and returned to Argentina, a simple citizen. In 1824 he sailed for France with his only daughter (he was now a widower). After completing her education and seeing her happily married he retired to Boulogne. In 1880 his remains were transported to Buenos Aires and reinterred in the cathedral. Argentina regards him as her greatest hero of the Revolution.

SAN MIGUEL, sän mē-gĕl′, city, El Salvador, capital of a department of the same name on the San Miguel River, at the foot of the volcano of San Miguel (7,120 feet), and 65 miles southeast of San Salvador. Founded in 1530, it is an active commercial and agricultural center noted for its annual fair. Indigo was once an important article of commerce. Chief products are coffee, sisal, and cattle. Pop. (1950) 26,831.

SAN MIGUEL DE ALLENDE, sän mē-gĕl′ dā ä-yān′dā, city, Mexico, in the State of Guanajuato, on the Mexican National Railroad, 34 miles north of Ceyala; named after the Mexican patriot, Gen. Ignacio Allende (1779–1811), who was born here. Wheat and beans are the chief agricultural products. Pop. (1950) 11,615.

SAN MINIATO, sän mē-nyä′tō, town, Italy, in Pisa Province, 21 miles west-southwest of Florence. The ancient cathedral dates from the 10th century and is adorned with many interesting monuments. Glass, olive oil, hats, and leather are manufactured. The town has considerable historical interest, especially as being the cradle of the Napoleon family. Pop. (1936) 3,082.

SAN NICOLAS, sän nē-kō-läs′, city, Argentina, capital of the San Nicolás district in northern Buenos Aires Province, situated at the head of the delta of the Parana River, 37 miles southeast of Rosario, with which it is connected by rail. It is an important railroad center, and a station for ocean steamers. It has manufactures of ceramics, textiles, and chemicals, large beef-packing houses, flour mills, and distilleries. The chief exports are wool and cattle products. Pop. (1947) 24,829.

SAN NICOLAS, Philippines. (1) Municipality, province of Ilocos Norte, on the Laoag River, three miles south of Laoag. It is on the coast highway. Pop. (1948) 15,567. (2) Municipality, province of Pangasinán, near the Agno River, 34 miles east of Lingayén. It is connected with Lingayén and also with towns to the south by highway. Pop. (1948) 18,218.

SAN PABLO, sän pä′vlō, **City of,** city, Philippines, Province of Laguna, Luzon; 45 miles south-southeast of Manila. It is the center of an area of volcanic elevations, with five small mountain lakes in the vicinity. There are indications of valuable mineral deposits. Pop. (1948) of metropolitan area, 50,435.

SAN PABLO BAY. See San Francisco Bay.

SAN PEDRO, săn pē′drō, formerly a city, California, in Los Angeles County, but annexed to Los Angeles in 1909 and since then an integral part of that city; altitude from sea level to 100 feet. A port of entry, its harbor, improved at great expense, is one of the best on the Pacific coast. Grains, fruits, and minerals are shipped; fish canning is a local industry. San Pedro has a fine civic center; the beach parks afford recreational facilities, and at Cabrillo Beach there is a museum with an aquarium and marine collections. Fort MacArthur, is situated here, on Point Fermin. The population, 1950, was about 40,000, and is included in the Los Angeles census count. See also Los Angeles.

SAN PEDRO, säm pā′thrō, town, Paraguay, capital of San Pedro Department, situated on a branch of the Paraguay River, about 90 miles north of Asunción. It is accessible for small steamers and exports maté. Pop. of district (1947) 11,483.

SAN PEDRO DE MACORIS, dā mä-kō-rēs′, city and province, Dominican Republic. (1) The city, capital of the similarly named province, is situated on the Caribbean Sea at the mouth of

the Higuamo River. The leading sugar center, it is one of the republic's chief export ports. Manufactures include tanning, alcohol distilling, clothing, candles, and soap. There is an international airport here.

(2) The province, which was organized in 1908, is situated in the southeastern part of the republic. Within its 520-square-miles area are the principal sugar plantations. Other commercial products are tropical fruit, timber, and cattle. Pop. (1950): city, 19,994; province, 64,214.

SAN RAFAEL, rȧ-fĕl′, city, California, and Marin County seat; altitude 25 feet; on San Pablo Strait; 17 miles north of San Francisco; on the Northwestern Pacific Railroad. It is the center of a stock-raising, dairying and general farming region, in which there is also a large suburban population. It has bus connection with San Francisco via the Golden Gate Bridge. Creamery products are processed, gloves and leather goods are made, and there are bottling works. Besides public and parochial schools, it has a Dominican college and several preparatory schools for boys. The city has a public library, an adequate equipment of parks and playgrounds, several recreation centers, a musical association; also, civic and service organizations. At the foot of Mt. Tamalpais, it has a scenic setting and a climate that attracts health seekers; near by are the Muir Woods and the Mt. Tamalpais State Park. A Spanish mission was established here early in the 19th century by Father Ventura Fortuni. Government is by mayor and council. Pop. (1950) 13,848.

SAN REMO, săn rā′mō or rē′mō, city, Italy, seaport in Imperici Province, 30 miles northeast of Nice, on the Mediterranean, in the famous Riviera district and a much frequented health and pleasure resort. The town is terraced, the ancient upper town with narrow and crooked streets lined with lofty buildings forming a strong contrast to the modern edifices of the lower town. Among its attractions are the cathedral, the Santurio della Guardia, the Santurio dell'Assunta with four handsome alabaster pillars and the Palazzo Borreo d'Olmo; the latter was ruined in World War II, and the city severly damaged. Important international conferences were held here in 1920. It was self-governed in 1170 and one of its bishops later sold it to Genoa. Pop. (1936) 23,963.

SAN SALVADOR, săn săl′vȧ-dôr, city, El Salvador, capital of the republic since 1840, situated near the base of the volcano San Salvador about 25 miles from the port of La Libertad on the Pacific Coast with which it has rail connection, in a pleasant valley at an altitude of 2,102 feet. The city is well laid out, having many pleasant parks and suburban resorts. It is subject to earthquakes and this fact has modified the methods of house construction, all the houses being low and surrounded by open areas. Its most noteworthy building is the Casa Blanca (white house), the residence of the President. Other notable structures are the library, university, and observatory. The city is an important industrial center; its manufactured products including soap, cigars, candles, cotton cloth, sugar, and spirits. It is also a thriving commercial center, doing a large trade in the products of the region, especially indigo and tobacco. Jorge de Alvarado founded San Salvador in 1525. From 1831 to 1839 it was the capital of the Central American Union. An earthquake all but destroyed it in 1854, another laid it low in 1873 and that of 1917, caused millions of dollars' worth of property losses. It has also suffered badly from destructive floods, the last occurring in 1934. Pop. (1950) 160,380.

SAN SEBASTIAN, săn sā-väs-tyän′, city, Spain, capital of the province of Guipúzcoa on the Bay of Biscay, 42 miles northwest of Pampeluna, and 10 miles from the French border; is a port and a natural and fortified stronghold. The principal buildings are the churches of Santa Maria and San Vicente, a nunnery, the courthouse, the schools of navigation, commerce, etc., theater, and hospitals. In the environs, on the Concha Bay, is Miramar, the royal palace. The industries of the town have greatly developed and include saw and flour mills, breweries, manufactures of preserves, soap, candles, glass, and paper, and there is considerable trade in English and French goods and in normal years, exports of wool, flour, wine, cutlery, firearms, copper-ore, and lead, and imports of sugar, silk, cotton, and linen goods, cocoa, machinery, and salted fish.

San Sebastian is Spain's most fashionable watering place, and was the summer residence of the royal family. Historically it has played an important role and has sustained several sieges, the most memorable in 1813, when Wellington with English and Portuguese forces took it by storm and burned it. Pop. (1940) 89,276.

SAN STEFANO, săn stĕf′ȧ-nō, **Treaty of,** a peace treaty of the Russo-Turkish War, concluded March 3, 1878, at San Stefano, a port on the Sea of Marmora. By its terms Bulgaria was to become a principality, extending from the Danube to the Aegean, and Rumania, Serbia, and Montenegro were recognized as independent. Russia was to receive a war indemnity of 300,000,000 rubles and the Dobruja, Kars, Batum, and other possessions. The congress held at Berlin, in June and July, 1878, greatly altered the provisions of this treaty, effecting peace on somewhat more moderate terms.

SAN VICENTE, săn bê-sān′tȧ, city, El Salvador, 27 miles east-southeast of the capital, lies almost central in the republic close to an extinct volcano of its own name. An attractive town, founded in 1635, its handsome church and a clock tower in the central park are the only notable buildings. A commercial and industrial center, its manufactures include textiles, footwear, and hats. From 1832 to 1839 it was the national capital. It has an annual fair. In 1936 it suffered a severe earthquake. Pop. (1950) 10,945.

SAN XAVIER DEL BAC, săn zā′vĭĕr dĕl bȧĸ, Spanish mission in Santa Cruz valley, eight miles south of Tucson, Arizona, established about 1687 by Father Eusebio Francisco Kino, Jesuit missionary to the Indians. The present church, erected about 1727, is a cruciform edifice with inner dimensions of 105 feet by 27 feet. Built of adobe with stone foundation and covering of fine cement, it faces south. The facade, highly ornamented with scroll work adorned with the arms of the Franciscan Order, is well preserved. Two towers, one unfinished, surmount the front. Over the main chapel is a massive dome of

splendid proportions and lightness. Several fine frescoes remain. The church's preservation is due to the devotion of the Papago Indians who took charge when the mission was secularized in 1827.

SAN'A or **SANAA**, sŏn-ä′, city, Yemen, capital of the kingdom, situated at an altitude of 7,250 feet in a well-watered valley about 90 miles northeast of the port of Hodeida. Of great antiquity, the city is massively built and is surrounded by a wall. Chief of its 48 mosques is the Jāmi' Masjid, a handsome structure erected on the site of a 6th century Christian church. San'a is an important trade center, dealing chiefly in coffee, dried fruit, and raisins. Sword blades and gold and silver jewelry are manufactured. The city was probably the center of an early Himyarite kingdom. In the Middle Ages it was ruled by Ethiopians. Subsequently it became the capital of an independent imamate, but in the 16th century, and again from 1872 to 1918, it was under Turkish control. Its importance was enhanced with the re-establishment of Yemen's independence after World War I. Pop. (est. 1950) 25,000.

SANBORN, Franklin Benjamin, American author and humanitarian: b. Hampton Falls, N. H, Dec. 15, 1831; d. Plainfield, N. J., Feb. 24, 1917. After being graduated from Harvard College in 1855, he became active in politics as the secretary of the Massachusetts Free-Soil Association, and he lent his aid to John Brown (q.v.) in the raid on Harpers Ferry, W. Va., after having vainly opposed the project. Throughout his active life, Sanborn was a journalist, having begun to contribute to the New Hampshire *Independent Democrat* in 1849, to the Boston *Transcript* in 1852, to the *Christian Register* in 1853, to the Boston *Traveller* in 1856, and to the Springfield *Republican* in 1856. From 1863 to 1867 he was an editor of the Boston *Commonwealth,* and from 1868 to 1914 of the Springfield *Republican.* For 30 years he edited the *American Journal of Social Science* (1867–1897), and he also contributed to the *Proceedings* of the Massachusetts Historical Society (1903–1915). In 1863 he became secretary of the Massachusetts State Board of Charities, the first established in the United States, and two years later he helped to organize the American Social Science Association, of which he was secretary until 1897. He was also among the founders of the National Conference of Charities (1865) and the National Prison Association (1871), and with Amos Bronson Alcott and William Torrey Harris (qq.v.) he established the Concord School of Philosophy (1879). His published works include *The Life and Letters of John Brown* (1885); biographies of Henry David Thoreau (1882), Samuel Gridley Howe (1891), Alcott (with Harris, 1893), Pliny Earle (1898), Ralph Waldo Emerson (1901), and Nathaniel Hawthorne (1908); *The Personality of Thoreau* (1902); *The Personality of Emerson* (1903); *Bronson Alcott at . . . Fruitlands, New England* (1908); *Hawthorne and His Friends* (1908); *Recollections of Seventy Years* (1909); *Sixty Years in Concord* (1916); and *The Life of Henry David Thoreau* (1917). He also edited works by the younger William Ellery Channing, Theodore Parker, and Thoreau.

SANBORN, Walter Henry, American jurist: b. Epsom, N. H., Oct. 19, 1845; d. St. Paul, Minn., May 10, 1928. He was graduated from Dartmouth College in 1867, taught school, and then studied law, being admitted to the Minnesota bar in 1871. He practiced law in St. Paul until 1892, when he was appointed a judge of the Circuit Court of the United States for the 8th Circuit; in 1903 he became presiding judge of the circuit and served in this position until his death. Sanborn was particularly interested in the law of personal injury. He also conducted the receiverships of several railroads: Union Pacific (1893–1898); Chicago Great Western (1908–1909); St. Louis-San Francisco (1913–1914); Denver & Rio Grande Western (1918–1919).

SANCHEZ CERRO, sän'chās sĕr'rō, **Luis M.,** Peruvian army officer and political leader: b. Piura, Aug. 12, 1889; d. Lima, April 30, 1933. Of Indian parentage, he had one of the most turbulent careers in South American history. He first took part in a revolution in 1914. In the following year he served as military attaché in Washington and then returned to Peru for military duty in various army posts. He led an uprising in 1922 and was imprisoned. On his release he was sent to Europe on a military mission and during his stay there served in the Spanish and Italian armies. In 1929 he received command of a battalion in Arequipa and in August 1930 led a revolt there against President Augusto Bernardino Leguía y Salcedo (q.v.), forcing his resignation. Sánchez Cerro then became provisional president, but a naval junta compelled him to resign in March 1931. Elected to the presidency later in the year, he ruled as a dictator. He was assassinated.

SANCHEZ DE BUSTAMANTE Y SIRVEN, sän'chās thā bōōs-tä-män-tā ē sēr-vān′, **Antonio,** Cuban jurist: b. Havana, April 13, 1865; d. there, Aug. 24, 1951. Graduating in law from the University of Havana, in 1884 he won by competitive examination the university's professorship of international law. While continuing to occupy this chair throughout his career, he took a prominent part in public affairs both in his native country and abroad. With the creation of the Republic of Cuba in 1902, he was elected senator and served until 1918. Meanwhile, in 1907, he served as Cuban delegate plenipotentiary at the Second International Peace Conference at The Hague. In 1919 he represented Cuba at the Paris Peace Conference, and two years later he was appointed a judge at the Permanent Court of International Justice. His numerous works pertaining to international law include *Proyecto de código de dereche internacional privado* (*A Project for a Code of International Private Law,* 1925).

SANCHI, sän'chĭ, village, Bhopal, India, situated about 23 miles northeast of the city of Bhopal. It is celebrated for its ancient Buddhist stupas or memorial mounds, some of which may date back to the reign of Emperor Aśoka (c.274–237 B.C.). Stupa No. 1, 54 feet high and 120 feet in diameter, is surrounded by a stone railing with four gateways, called torana, carved with scenes from the Buddha's life and Buddhist symbols. The stupa itself is a hemisphere of stone and brick crowned with a platform. Dating from the Gupta period (c.318–500 A.D.) is a rectangular Hindu temple.

SANCHO, săn'shōō, the name of two Portuguese kings of the Burgundian dynasty.

Sancho I (known as the City-Builder, 1154–1211) succeeded his father, Alfonso I, in 1185. Most of his reign was spent in wars with the Moslems, from whom he wrested new territories on which he settled Portuguese colonists. He also established military orders and built roads and cities.

Sancho II (1208–1248), grandson of Sancho I and son of Alfonso II, ascended the throne of Portugal in 1223. His reign was marked by struggles with the clergy and the nobility, and in 1245 he was deposed by Pope Innocent IV in favor of his brother Alfonso, with whom he waged war from 1246 until his death.

SANCHO PANZA, săng'kō păn'zà (Span. săn'chō pän'thä), the faithful squire in Miguel de Cervantes Saavedra's *Don Quixote* (q.v.), who accompanies his master upon his travels but who takes a prosaic view of the incidents colored and distorted by his master's illusions. He is famous for his shrewd proverbs.

SANCHUNIATHON, săn-kū-nī'à-thŏn, or **SANCHONIATHON,** reputed author of a history of Phoenicia and Egypt, entitled *Phoinikika,* and published by the grammarian Philo Byblius (q.v.) as a Greek translation from the Phoenician. According to Philo, Sanchuniathon was a native of Berytus (modern Beirut) and lived during the reign of the Assyrian queen Semiramis. Other writers describe him as a Phoenician living before the Trojan War. Some critics maintain that no such person ever existed and that the work attributed to him was written by Philo himself or, as others think, by Eusebius of Caesarea (q.v.). A fragment of the work is preserved in Eusebius' *Praeparatorio Evangelica,* in which the author quoted Sanchuniathon as evidence in corroboration of certain Biblical statements assailed by Porphyry (q.v.). The Greek fragments still extant were published by J. C. Orelli in 1826 and by C. Müller in 1849, and occasioned keen controversy. The conclusion at which Ernest Renan (q.v.) arrived is that a Phoenician at the time of the Seleucidae (312–64 B.C.), whose real or feigned name was Sanchuniathon, wrote in Phoenician a work on history and mythology, and that Philo Byblius later made a free translation of it.

SANCROFT, săn'krôft, **William,** English prelate: b. Fressingfield, Suffolk, Jan. 30, 1617; d. there, Nov. 24, 1693. He was graduated from Cambridge University in 1637. In 1663 he was appointed dean of York, and in the following year became dean of St. Paul's Cathedral, London, whose restoration he furthered. In 1678 he was consecrated archbishop of Canterbury, but in 1688, on presenting with six bishops a petition against the reading of James II's Declaration of Indulgence (q.v.), was committed to the Tower of London for trial. He was acquitted, but after the accession of William and Mary he refused to take the oath of allegiance to the new sovereigns and was deprived of his see in 1690. In 1691 he retired to Fressingfield, where he remained in seclusion until his death.

SANCTI SPIRITUS, sănk'tē spē'rē-tōōs, municipality and town, Cuba, situated in Las Villas province, 45 miles southeast of Santa Clara. It was founded in 1514, being one of the seven original Cuban towns established by Diego de Velásquez. The town contains examples of colonial architecture. The center of an agricultural region, it has an active trade in sugar and cattle. Pop. (1943) 14,164.

SANCTIFICATION, a theological term for which Protestant and Roman Catholic definitions differ widely. For Protestants, sanctification is distinct and separable from justification; for Roman Catholic theologians, the two are inseparable and hardly distinguishable from each other. John Calvin (*Institutes,* book 3, chap. 2), the Lutheran *Solida Repetitio et Declaratio* (Art. 3), and Martin Luther and Philipp Melanchthon teach that justification is simply a judicial act of God's free grace liberating the sinner from condemnation, while original sin persists in man's nature, to be weakened, not extirpated, by the communication of the Holy Spirit: thus sanctification is a process which begins after justification. Justification in the teaching of the Roman Catholic Church is defined by the Council of Trent (Session 6, chap. 7) to be "not only remission of sins but also sanctification and renovation of the inner man through the free acceptance of grace and gifts"; and in another place (Session 6, chap. 5) the council teaches that "justification is a transference out of that state in which man is born a son of Adam, into the state of grace and adoption of the children of God, by the Second Adam, Jesus Christ, our Saviour." From this it appears that in Roman Catholic theology sanctification is inseparable from justification, which depends upon it, and that "the sinner is justified and sanctified by the one same act" (Giovanni Perrone, *Praelectiones Theologicae,* tr. *de Gratia,* part 2, chap. 1).

SANCTORIUS, săngk-tō'rĭ-ŭs (Latin name of Santorio Santorio), Italian physician: b. Capodistria, 1561; d. Venice, Feb. 24, 1636. From 1611 to 1624 he was professor of medicine at the University of Padova (Padua), and from 1629 until his death he studied in Venice. He conducted a series of experiments on insensible perspiration, and was responsible for several inventions, including a clinical thermometer and an instrument for measuring the pulse.

SANCTUARY, Privilege of, is the exemption of certain places, and of criminals taking refuge in them, from the ordinary operation of the law of arrest. It is also called the right of asylum (q.v.). The six cities of refuge mentioned in the Book of Numbers, chapter 35, were to afford the privilege of sanctuary to "every one that killeth any person unawares." That institution in Israel and the institution of asylum among the Greeks and Romans gave rise to the similar institution of sanctuary in Christendom. The privilege of sanctuary was accorded certain churches by the Roman emperors of the late 4th century; throughout the Middle Ages it was recognized as attaching to all churches. In England a person accused of felony might take refuge in a sanctuary and then, within 40 days, take before a coroner an oath of abjuration entailing perpetual banishment to a foreign Christian country. Statutes of the reign of Henry VIII greatly curtailed the privilege of sanctuary, the number of cities retaining a charter from the king being reduced to seven. Such exemption was abolished throughout the kingdom altogether by the statute of 21 James I, in 1623. But the privilege of sanctuary

against civil process still persisted, attaching to certain places, parts or supposed parts of royal palaces, as Whitefriars (("Alsatia"), the Savoy, and the Mint: these were secure refuges for debtors till 1697, when their privilege was abolished by the statute 8 and 9 of William III. All religious sanctuaries in Scotland were done away at the Reformation; but the Abbey and Palace of Holy Rood with its precincts, including the hill of Arthur's Seat and the Queen's Park still afforded protection against civil process for debt; and the privilege still exists in form, though in fact it never has to be invoked since the abolition in 1880 of imprisonment for debt. It was the abuses to which this system gave rise, as tending to defeat the ends of justice, that led to its abolition in all Christian countries. A modern form of the system is extraterritoriality (q.v.).

SANCTUS, or **TERSANCTUS**, a passage in the liturgical service of the Catholic Church, eastern and western, and in part still retained in the Anglican Book of Common Prayer: it is the final passage of that part of the liturgy (and of the Anglican communion service) which is called the Preface. The name Sanctus or Tersanctus (thrice holy) is given to it because of the word sanctus (holy) thrice repeated, with which it opens. *Sanctus, sanctus, sanctus, Dominus Deus Sabaoth,* etc., that is, "Holy, holy, holy, Lord God of Hosts, heaven and earth are full of Thy glory. Hosanna in the highest. Blessed He that cometh in the name of the Lord. Hosanna in the highest." In the prayer book only the first clause is used, followed by "Glory be to Thee, O Lord Most High. Amen."

SAND, sänd, **George,** assumed name of Lucile-Amandine-Aurore Dupin, French novelist: b. Paris, 1 July 1804; d. Nohant, in Berry, 8 June 1876. Her father's mother was an illegitimate daughter of the noted Maurice de Saxe, son of Augustus II, king of Poland, and was herself widow of the Comte de Horn, bastard of Louis XV, when she married George Sand's grandfather, Dupin de Francueil. George Sand's aristocratic, though clouded, paternal ancestry was mated with plebeian blood, her mother being a Parisian *modiste.* She was brought up chiefly in the country at her grandmother's home in Nohant, but was partly educated at the Couvent des Anglaises in Paris. Her youth was dreamy and emotional. At 18 she was married to the Baron Casimir Dudevant, but the marriage proved unhappy, and resulted, after some years, in a separation. In 1831 she began a Bohemian career in Paris, associating with young literary men and students and herself often wearing masculine costume. The first important one of her many *liaisons,* so often with younger men, was with Jules Sandeau. They wrote at first under the name of Jules Sand, but soon she composed her own novels, signing them George Sand. Her first independent book was 'Indiana' (1832). George Sand's extraordinarily numerous novels are usually divided into four chronological groups. The earliest ones, in particular, which reflect her emotional discipleship of Rousseau and of the Madame de Staël of 'Delphine' and of 'Corinne,' as well as her own domestic infelicities, aroused a storm of criticism. Her hostility to accepted social conventions, her attacks on the tyranny of marriage, her portrayal of the misunderstood and unappreciated woman or *femme incomprise,* aroused the tumult of indignation which greeted 'Valentine,' 'Lélia' and 'Jacques' as expressions of over-emancipated feminism. In 1833, before the appearance of 'Jacques,' began the madly romantic love-affair with Alfred de Musset, six years her junior, and already a noted poet. Together they went to Italy, but within a few weeks, by the time of their arrival in Venice, dissension had begun. This was accentuated by the successive illnesses of George Sand and of Musset and his jealousy of the handsome young Italian doctor, Pietro Pagello, who was called in to treat him. Musset tried first a rôle of magnanimous forgiveness and returned to France, leaving George Sand with Pagello. She, however, soon repented of the change and, after stormy efforts at a renewal of the old intimacy, the final break between George Sand and Musset came in 1835. As a result of romantic literary "exhibitionism" this affair was the source of much material, Musset's 'Confession d'un enfant du siècle' and many of his finest poems, George Sand's 'Elle et lui,' not to mention documents by relatives or partisans of one or the other principal. Roughly speaking, George Sand's second literary period now begins. She discards somewhat the portrayal in her novels of beautiful men and women with obstreperous souls, and comes under the influence of people like the musician Chopin, or advocates of social reform and humanitarianism such as Michel (de Bourges), Lamennais and Pierre Leroux. Down to about the middle of the 19th century her novels, while still touched with romantic passion, tend to present in sentimental and somewhat fantastic fiction plans for the reconstruction of society and mating of classes, or visions of a world happily organized in justice and sympathy. 'Mauprat' has the excellence of a well-told story, but more characteristic works of this period are 'Spiridion,' 'Les Sept cordes de la lyre,' 'Consuelo,' 'La Comtesse de Rudolstadt,' 'Le Meunier d'Augibault' and 'Le Péché de monsieur Antoine.' In 1838–39 she made a journey to Majorca with the consumptive Chopin, a trip commemorated in 'Un hiver à Majorque.' The intimacy continued for several years longer and Chopin appears in disguise in 'Lucrezia Floriani.' At the beginning of the republic of 1848, George Sand greeted the new régime with joy, wrote 'Lettres au peuple,' collaborated with Ledru-Rollin, but soon became disheartened at popular excesses and ceased her political propaganda. Meanwhile she had gradually turned to the composition of novels of a third category. As early as 1844 in 'Jeanne' she had tried to combine the mystical spirit with a story of rustic life; then devoting herself to the idealized portrayal of the country, especially of her own province, she composed the pastoral idylls which are her works most read to-day 'La mare au diable,' 'La petite Fadette,' 'François le champi,' 'Les maîtres sonneurs.' 'Les beaux messieurs de Bois-Doré' is an incursion into the literary pastoral under the influence of Honoré d'Urfé's 'Astrée.' Finally, during the last period, beginning about 1860, she wrote sentimental stories, but of a more conventional character and free from the impractical utopianism

or even impossible fantasy which had characterized many of her earlier works. To this class belong *Jean de la Roche* and *Le Marquis de Villemer* (1861). This last work won even greater success when dramatized with the help of the younger Dumas, who gave it a wit and vigor which the diffuseness of George Sand herself could never achieve. Her style was, indeed, extremely diffuse. Her facility of composition was extraordinary and her plots came as she put pen to paper. She could write or stop writing at any hour of the day or night. Thus we can understand the abundance of her works, of which only a few can here be mentioned. Her influence has passed away, and she has long ceased to be thought of as revolutionary, but her books will always be remembered as both the reflection and inspiration of utopian visions of her age; and her intimacies with so many famous men give an interest to her in addition to her own merits. Her *Histoire de ma vie* of 1855 is of interest in this respect and of much psychological value. See also ELLE ET LUI.

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SAND, name of two Pacific islands, possessions of the United States. (1) The more westerly of the two islands of the atoll Midway (q.v.) is named Sand; it is 2 miles long, and at the northern end 1 mile in breadth. It contains a cable station and lighthouse, and in 1935 Pan American Airways constructed on the island a hotel and other facilities for its transpacific services. (2) One of the two small islets within the reef surrounding Johnston Island (q.v.) also bears the name of Sand; it lies about a mile northeast of Johnston proper.

SAND, a mass of unconsolidated mineral grains of practically uniform size, large enough to be detected with the unaided eye, but too small for the grains to be readily picked up by hand. In composition, sand varies greatly, from grains of pure silica or pure calcium carbonate to a complex mixture of many minerals. Pure silicious sand is in most cases primarily derived from the disintegration of igneous or other rocks, containing silica, which remains behind after the removal of other minerals more subject to chemical disintegration. The separation is usually accomplished by the waves of the seashore, and in general it may be said that the longer the sands are subject to wave activity, the more complete will be the sorting process. Calcareous sands result mostly from the grinding up by the waves of shells, corals, and the like, or of limestone beds; and may be of all degrees of purity. The so-called aeolian limestone of the Bermudas consists of calcareous shell sand which has drifted into great dunes and later been consolidated. Drifting dunes of gypsum are known in New Mexico. Granite, when broken down by mechanical agencies, forms a quartz-feldspar sand known as feldspathic sand, or arkose sand. Basic rocks, similarly disintegrated, form ferromagnesian or gray wacke sand. On the shore, the sands are kept firm by the water held between the grains by capillary attraction. If this evaporates, the sands are driven inland by the winds, piled up into sand dunes and often convert extensive districts into sand deserts. (See DESERT). River sands derived from crystalline or metamorphic rocks often carry gold or other precious metals in the forms of grains or nuggets. Auriferous sand constitutes the source of much gold, in placer deposits. Sands washed by temporary streams from glaciers or glacial moraines and deposited in front of the ice, build up sand-plains, which are the chief source of sands and gravels in glaciated regions. (See GLACIAL DEPOSITS). The ordinary grades of sand are much used in the building trades for mortar and concrete; very pure quartz is largely used in glass manufacture; and various other grades of sand are employed for a very large number of purposes, including water filtration, the making of molds in foundries, and manufacture of sandpaper and scouring soaps. See also MINERAL PRODUCTION OF THE UNITED STATES.

SAND BADGER, or **HOG BADGER,** a small East Indian badger (*Arctonyx collaris*), which gets its first name from its customary station and burrowing habits, and the second from its piglike rooting snout; it is also known as balisaur. Its general habits are like those of its type. See also BADGER.

SAND CRACK, a crack or fissure in the hoof of a horse, due to a disease generally referred to the coronet, sometimes to the laminae covering the pedal bone, specifically to the membrane which secretes an essential adhesive substance entering into the constitution of the hoof. The crack generally extends from the coronet toward the sole. In the fore feet the inner quarters are most frequently attacked; in the hind feet, the toes. There are various forms of sand crack, the most common of them being usually called quarter crack. See HOOF.

SAND CREEK MASSACRE, a sanguinary attack by Col. John M. Chivington on Nov. 29, 1864, on a Cheyenne and Arapaho camp in Kiowa County, Colorado. The Indian commissioner had sent about 400 Indians of the tribes above named to a camp at Sand Creek. The military desired to cow the Indians by heavy punishment for their atrocities against the whites, while the Indian Department earnestly sought to mediate among the white settlers, the military and the aborigines. Chivington slaughtered 131 men, women and children, and a long and costly struggle ensued. Not until 1871 did the Cheyenne put aside the sword and consent to go on a reservation.

SAND DARTER, a genus (*Ammocrypta*) of small fresh-water fishes (see DARTER), whose species, especially *A. pellucida,* common in the mid-continent streams, buries itself in the sandy bottom with astonishing quickness and completeness.

SAND DOLLAR, a name given along the New England coast to one of the flat, dollar-shaped villose sea urchins of the genus *Echinarachnius;* several species are to be found on sandy bottom near shore and others are numerous in greater depths, affording some food to cod, flounders and other bottom-feeding fishes.

SAND DUNE. See DUNE.

SAND GROUSE, a family (Pteroclidae) of birds related, on the one hand, to the pigeons (Columbae), and, on the other, to the grouse (Gallinae). The sand grouse inhabit the plains and sandy deserts of the tropical regions and countries of the Eastern Hemisphere. The legs are longer than in grouse, the tail and wings pointed, and the general aspect dovelike. The best-known species are the *Pterocles alchata* and the *P. arenaria.* Both of these birds occur in southern Europe. They fly well and feed upon seeds and insects. The eggs are four or five in number and the nest is constructed in a rough fashion on the ground. Other species inhabit Asia and Africa. Pallas' sand grouse has been made the type of a different genus, *Syrrhaptes,* in which the tarsi are feathered and the anterior toes united in a common integument, as well as feathered to the claws, the hallux absent. It is a native of the plains of central Asia, where it occurs in vast numbers. Much interest was excited in 1863 and again in 1888 by great numbers of these birds invading Europe. They crossed the North Sea and were found in considerable numbers throughout Britain, and as far north as the Faeroe Islands. They even bred in Great Britain in one or two cases. Smaller invasions occurred in other years. Sand grouse are classed as game birds in the regions in which they occur and especially in India.

SAND-HILL CRANE. See CRANE.

SAND HOPPER. See AMPHIPODA.

SAND LAUNCE, or **SAND EEL,** a small teleost fish of the family Ammodytidae, which is represented on all the colder coasts of the world by some 10 species, but whose relationships are undetermined. They have the shape of eels, from 6 to 12 inches long, according to species, but are distinguished by the fact that the tail fin is well developed and is distinct from the dorsal and anal fins, while it is also forked at its extremity. The skin is silvery in appearance, but destitute of true scales. The lateral line runs along the side of the back. The dorsal fin begins just behind the head and extends nearly to the caudal fin. The anal fin extends to about one third or one half the length of the body. Several species are to be found on both coasts of North America.

SAND MARTIN. See BANK SWALLOW.

SAND PIKE, a fish, the sauger (q.v.).

SAND PIPE, cylindrical hollows, often of great depth and filled with sand and gravel. They are characteristic of all rocks, but have been particularly described from the white chalk of England and France, where Sir Charles Lyell found them up to 12 feet in diameter and over 60 feet deep. They are analogous to potholes formed along mountain streams through the gyrating motion of the water in an eddy. The holes are cut by loose rocks kept in constant circular motion by the water. Analogous hollows, termed glacial potholes or moulins, are also found where a superglacial or englacial stream plunges down a crevasse and sets the rocks at the bottom of the crevasse in motion, thus often cutting to great depths. These holes or pipes are afterward filled with sand and gravel either by the stream or upon the melting of the ice. These holes have also been attributed by Lyell to the chemical action of water charged with carbonic acid gas, which was derived from the decaying vegetation of the soil through which the water passed.

Similar deposits of sand, generally solidified into sandstones or quartzites, are not infrequently found in the older rocks of all countries. These are generally masses in the form of dikes penetrating sedimentary or crystalline rocks, often to a great depth. Many of these sandstone dikes were formed at a very early period in the earth's history, when the fissures were formed either through solution, atmospheric disintegration or in some cases through earthquake shocks.

SAND SHARK, a small voracious shark of the family Carchariidae, which is mainly extinct, the three existing species occurring chiefly in the Atlantic, where *Carcharias littoralis* (J. and E.) occurs numerously on the American coast between Cape Cod and Cape Hatteras; it is doubtfully different from the one frequently seen along the European coast. These sharks are similar to the mackerel sharks (*Lanuridae*) and reach a length of five or six feet.

SAND SUCKER, a local name in California for a familiar fish, the whiting (q.v.).

SAND WASP, any of many solitary wasps which burrow in sand or loose earth and leave their eggs there in well-provisioned cells. There are numerous species in all parts of the world. See WASPS.

SAND WHEEL. The removal of fine waste, sand and slime from mills where ores are crushed and concentrated may call for the use of special devices, one of which is the sand wheel. If the mill stands on a hillside such refuse can usually be washed down troughs, called launders, to lower ground where it may accumulate. If the mill site is level land and the mill handles a large amount of rock then the refuse must be lifted that it may flow to a settling place. Various types of elevators and conveyors are used for this purpose. The sand wheel, though bulky, has the merits of simplicity and few wearing parts, and is simply a development of the water wheels used since ancient times for irrigation purposes in Eastern countries. At ore mills in many parts of the world sand wheels may be seen, notably at the great gold mines of the Transvaal, where some are over 50 feet in diameter.

A giant sand wheel, one of the largest ever erected, was built to handle the mingled sand and water from the great crushing and concentrating plant of the Calumet and Hecla Mining Company at Lake Linden, Mich. This mill treated an

enormous tonnage of copper-bearing rock, and the resulting waste was run into the lake where the accumulations of years covered many acres. The large wheel was erected that the waste might be lifted higher to flow over the old deposits. It was 65 feet in diameter, elevated the water and waste to a height of 50 feet and had a capacity of 75,000,000 gallons in 24 hours.

It was constructed by the Robert Pool and Son Company of Baltimore, Md. In the general principles of design involved the wheel did not differ materially from other segmental iron and steel wheels of large diameter, but was of interest from its size. It was driven by an electric motor of 750 horse power through a pinion wheel 37 inches in diameter having a shaft carrying a wheel that engaged a pinion on the motor shaft. The wheel dipped into a pit 100 feet long, 12 feet wide and 30 feet deep that received the sand and water. From this pit the refuse was scooped up and discharged into a launder at an elevation of about 50 feet. For protection against the elements, the winter climate being severe, the wheel was housed in a building high enough to cover it entirely.

SANDAL, a kind of covering for the feet used among the ancient Jews, Greeks and Romans and which we find to be of the highest antiquity. It usually consisted of leather or of a thick cork sole covered above and beneath with leather and neatly stitched on the edge. It left the upper part of the foot bare and was fastened on by means of straps, crossed over and wound around the ankle. In later times sandals became articles of much luxury, being made of gold, silver or other precious material and beautifully ornamented. See Boots and Shoes.

SANDALWOOD, a fragrant wood furnished by the genera *Santalum* and *Fusanus,* of the family Santalaceae. The principal source of the genuine sandalwood is a small evergreen tree (*Santalum album*), partly parasitic in growth, with opposite entire leaves and thyrses of yellowish flowers which resemble those of the privet. It grows wild and is now also cultivated in the dry regions of southern India and on the mountains of the Malay Archipelago.

The trees are mature in about 20 years and are then cut down, the trunk then being about a foot in diameter. The felled trunks are left on the ground in order that the white ants may eat off the useless sapwood, the insects leaving the aromatic heart wood untouched. When thus cleaned the sandalwood is sawn into small pieces and then dried slowly to improve the fragrance and to prevent splitting. This heart wood is yellowish-brown, very hard and close-grained, and made odorous by the presence of an oil which is still more abundant in the root. The oil is distilled from the roots and chips and is largely used as a perfume, especially in India, and also as a medicine; it is said to have replaced copaiba in the treatment of diseases of the mucous membrane. The heart wood is used especially by the Chinese for carvings, fans, boxes, and so forth, not only because of its lasting perfume, but because it repels insects; it was employed in India during the 5th century at least and is still a necessary article in various Buddhistic ceremonies, in cremations, for caste marks, and for incense. It was probably one of the ingredients of the Levitical incense and the almug of Scripture. Sandalwood was originally obtained only in India, but other species (*S. freycinetianum* and *S. pyrularium*) were found in Hawaii and in other Pacific islands and led to a trade so ruthless that many deaths ensued and the supply of trees was nearly exhausted.

A small leguminous tree (*Pterocarpus santalinus*) furnishes the red sandalwood (or sanderswood), having a heart wood, first dark red, but becoming brownish on exposure, and used as a dyestuff, giving reddish-brown hues to woolens. It was employed in powdered form to color foods and was considered by Hindu physicians to be astringent and tonic. Various inferior qualities of sandalwood are obtained from *Bucida capitata,* the *Myoporaceae* and other trees.

SANDARAC, a friable, dry, almost transparent resin, which is imported from Morocco, in pale yellow tears, somewhat harder than mastic. It exudes from the bark of the small coniferous sandarac tree, also called the tear tree (*Callitris quadrivalvis*), a native of the north of Africa and a characteristic tree of the Atlas Mountains. The Australian species of *Callitris* furnish a similar resin. Sandarac is not used in great quantity. Although a medicine in high repute at one time and later used for a pounce powder, to prevent ink from spreading when writing over an erasure, its chief employment now is in the making of varnishes, the same as mastic. The mahogany-colored wood of the sandarac tree is highly balsamic, extremely durable and is utilized by cabinetmakers and mosque builders; it is said to have brought fabulous prices in Pliny's time.

SANDBAGS, in fortification and other military operations, are coarse canvas bags, about 30 inches long and 15 inches thick, filled with sand, and much used in cases where cover for troops is required to be speedily obtained.

SANDBLAST, an apparatus for the use of sand as a blast in cutting and engraving glass, stone, metal, and the like. The sand is blown against the article to be cut by a blast of air or steam, which quickly cuts away the unprotected surface, leaving in relief that part of the surface guarded from the effect of the sand by patterns of iron or other substance harder than that which it is desired to efface. The sand blast is much used to clean the exterior of stone buildings.

SANDBUR, either of two very dissimilar plants. One, also called the buffalo bur (*Solanum rostratum*), is a weed, native to the western plains of the United States; it is the original food of the potato bug, and has worked eastward, its seeds having traveled at first, perhaps, in the hair of the bison. The sandbur is an annual, densely pubescent, and prickle-armed plant, having the characteristic star-shaped flowers of the potato, although yellow in hue. The calyx is densely prickly, and surrounds the berry in fruit, the prickles becoming as long as the berry itself.

A grass (*Cenchrus tribuloides*) is also called sandbur, and is commonly found near seashores or in waste land, in the eastern half of the United States, where it is becoming a noxious weed in some places. It has robust stems partly decumbent from an annual root, and branches freely. The leaves are flat, and the floral involucres are crowded in terminal spikes on a rough stem, and form spiny burs, which stick easily to clothing or

the hair of animals, and so may be carried long distances.

SANDBURG, Carl, American author: b. Galesburg, Ill., Jan. 6, 1878. Winner (in 1940) of the 1939 Pulitzer Prize in history for his monumental four-volume *Abraham Lincoln: The War Years,* he is known not only as one of America's most outstanding biographers, but also as the "laureate of industrial America." His poetry, written in popular language and enriched with a liberal sprinkling of folklore and idiomatic expression, was written both for and about the people of America, particularly the workingman. His subjects were derived primarily from the Middle Western environment he knew so well; and throughout his work he indicates a consistent sympathy with the downtrodden without indulging in sentimentality. The rhythm of his poetry is peculiarly his own, as developed in his use of the broken or extended line instead of the more conventional meters. While his use of slang and the earthy idioms of the street and factory shocked many of his early readers, even the harshest of his poetry emerges with a realistic beauty of its own in tempo with the people and the history it portrays.

The son of poor Swedish immigrants, Sandburg was ideally suited to become the biographer of Lincoln. He received very little schooling and performed a variety of odd jobs in his early years, working as driver of a milk wagon, barbershop porter, bricklayer, theatrical scene shifter, truck handler in a brickyard, and turner apprentice in a pottery—all of which brought him in contact with the people and scenes he was to describe later. At the age of 17 he went to Kansas where he worked as a wheat harvester and dish washer before returning to Galesburg to become apprenticed to a house painter. In the Spanish-American War he served several months (1898) in the Sixth Illinois Volunteers. Then, having been persuaded by a friend to supplement his meager education, he worked his way through Lombard College (1898–1902) without graduating, although the college awarded him a Litt.D. degree in 1928. After more odd jobs, he went to Milwaukee where he was district organizer for the Wisconsin Socialist-Democratic Party for a year, secretary to the mayor (1910–1912), and associate editor of *System Magazine* (1913). Eventually he worked his way into the field of journalism, becoming editorial writer for the Chicago *Daily News.* Thereafter he turned seriously to his writing, lectured in various universities, and began a series of tours throughout the country singing folksongs to the accompaniment of his guitar. He was elected to the American Academy of Arts and Letters in 1940. Together, his *Abraham Lincoln: The War Years* (1939) and his 2-volume *Abraham Lincoln: The Prairie Years* (1926) comprise one of the greatest historical works ever written about an American. To these was added his *Lincoln Collector* in 1948. Another Civil War volume, *Storm Over the Land,* appeared in 1942; and in 1943, *Home Front Memo* was concerned with World War II. His poetry includes *In Reckless Ecstasy* (1904), *Chicago Poems* (1915), *Corn Huskers* (1918), *Smoke and Steel* (1920), *Slabs of the Sunburnt West* (1922), *Selected Poems,* edited by Rebecca West (1926), *Good Morning, America* (1928), and *The People, Yes* (1936), the latter often called his greatest poetic work and one which he himself described as "my footnote to the last words of the Gettysburg Address." He also wrote *Rootabaga Stories* (1922), *Rootabaga Pigeons* (1923), *Potato Face* (1930), and *Early Moon* (1930) for children; *The Chicago Race Riots* (1919); *The American Songbag* (1927), a collection of ballads and songs largely contributed by his audiences; *Steichen the Photographer* (1929), a biography; and *Remembrance Rock* (1948), a historical novel. He was co-author with Paul M. Angle of *Mary Lincoln, Wife and Widow* (1932), and with Frederick Hill Meserve of *The Photographs of Abraham Lincoln* (1944).

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SANDBY, Paul, English painter: b. Nottingham, 1725; d. London, Nov. 9, 1809. He was one of the earliest painters in water colors in England, and has been styled "the father of the water color school," but began life as a teacher of boys and resolved on an artistic career only after his appointment to the staff of the military drawing department of the Tower of London (1741). In 1747 he was draughtsman for the government survey of the Highlands of Scotland, which gave him a good opportunity for sketching scenery. In 1752 he made 70 drawings of Windsor Castle and Eton, and afterward he accompanied Sir Joseph Banks on a tour of Wales. In 1768 he was appointed drawing master at Woolwich Academy, and became one of the most fashionable art teachers of his day. His *Views of the Encampment in the Parks* (1780) illustrate his style. He outlined his subjects with a pen and then washed them in with colors in a very simple and direct way. His best works are those in body colors, which are tinted with richness, depth and refinement and are not conventionalized by the bold pen outline. As a caricaturist, he is known by his ridicule of Hogarth's *Line of Beauty,* and his caricature portraits, such as those of *Lords North and Thurlow.* He was a member of the Incorporated Society of Artists, and one of the original members of the Royal Academy, founded in 1768.

SANDEMAN, săn'dê-măn, **Robert,** Scottish religious leader: b. Perth, Scotland, 1718; d. Danbury, Conn., April 2, 1771. He studied at Edinburgh and afterward engaged in the linen trade. On marrying the daughter of the Rev. John Glass (founder of the Glassites), he adopted his pastor's views in opposition to all church establishments and became an elder in his congregation. Soon afterward he published a series of letters, in which he endeavors to show that a justifying faith means nothing more than a simple assent to the divine mission of Christ. Sandeman went to London in 1760 and managed to gather together a congregation of his own followers, who were called Sandemanians. In 1764 Sandeman accepted an invitation to New England, and became the author of some theological tracts, letters, and discourses, besides his *Letters on Theron and Aspasio.* The Sandemanians revived the love feast (to take place in each other's houses); the kiss of peace; the support of the poor members by the community; washing each other's feet; community of goods; they maintained the unlawfulness of saving money, etc. They still have a slender following at Danbury, Conn. The most noted personage professing the Sandemanian faith

was the great scientist, Michael Faraday (q.v.), who lived and died in that communion.

SANDEMANIANS. See SANDEMAN, ROBERT; RELIGIOUS SECTS.

SANDERLING, a sandpiper (*Calidris arenaria*), peculiar in lacking the hind toe. This bird averages seven to eight inches in length, and is colored in winter, gray on the upper and white on the under parts; the spring plumage differs in exhibiting reddish tints, marked with black. It is nearly cosmopolitan, breeding in the Arctic regions of both hemispheres, and migrating to the southern parts of South America and Africa, though many winter in the Southern States. The food consists of worms, crustacea, etc. These birds chiefly inhabit the sandy tracts of the sea-beach, and the estuaries of rivers, but are common about large bodies of water in the interior also, and associate with other species. The flesh is nutritious and pleasant to the taste, and the bird is a favorite with gunners in quest of shore-birds.

SANDERS, Frank Knight, American scholar: b. Batticotta, Jaffna, Ceylon, 5 June 1861; d. 20 Feb. 1933. He was graduated from Ripon College, Wisconsin, in 1882, was instructor at Jaffna College, 1882–86, and studied semitic languages at Yale 1886–87. He was Woolsey professor of Biblical literature at Yale 1893–1901; held the chair of Biblical history and archæology and became dean of Yale Divinity School, 1901–05; was secretary of the Congregational Sunday School and Publication Society 1905–08; president of Washburn College, Kansas, 1908–14; and, 1914–27, director of the Board of Missionary Preparation. He published with C. F. Kent 'The Messages of the Bible' (12 vols., 1897–1912) and is author of 'The Teachers' Life of Christ' (1907); 'Studies in the Life of Paul' (1908); 'History of the Hebrews' (1914); 'The World's Living Religions' (with H. A. Sherman, 1923).

SANDERS, Henry Arthur, American classical scholar: b. Livermore, Me., 1868. He was educated at the universities of Michigan, Berlin and Munich. He was connected with the faculty of the University of Michigan in 1893–95, and continuously after 1899, becoming professor of Latin in 1911. In 1915–16, and in 1928–31, he was on leave of absence as acting director of the School of Classical Studies of the American Academy at Rome, Italy. He is a contributor to various philological, archæological and educational journals; edited 'Roman History and Mythology' (1910); and is author of 'Roman Historical Scenes and Institutions' (1904); 'The New Testament Manuscript in the Freer Collection' (1912); 'The Old Testament Manuscript in the Freer Collection' (1917); 'Washington Manuscript of the Psalms' (1917), etc.

SANDERS, Liman von, German general and field-marshal: b. 1855. "Liman Pasha" was sent to Turkey in 1913 as head of a military mission to reorganize the Turkish army, succeeding Marshal von der Goltz. In May 1914 he issued from Constantinople sealed orders for mobilization to be delivered to every mayor and village president, and to be opened only on telegraphic notice from the war office. These orders were unsealed on 3 August. Early in 1915 he is said to have been the chief instrument in hindering the actions of the Turkish peace party's plans. He personally conducted the defense of the Dardanelles against the powerful attacks of the British navy and army, establishing his headquarters at Gallipoli, the centre of the fighting. He informed American war correspondents in October 1914 of the practical impossibility of the capture of the Gallipoli peninsula with its impregnable fortifications, which had been the work of the British covering a number of years. He was succeeded in August 1915 by the Grand Duke of Mecklenburg and was made commander-in-chief of the Turkish forces on the Caucasian front. At the British investment of Jerusalem he forsook the Turkish army and returned to Constantinople in September 1917. When the Entente and associated powers concluded an armistice with Turkey in 1918 Liman von Sanders was arrested in Constantinople and remained under detention there until August 1919 when he was repatriated.

SANDERS' RAID INTO EAST TENNESSEE. On 14 June 1863 Col. W. P. Sanders, with 1,500 mounted men and two guns, left Mount Vernon, Ky., to destroy the East Tennessee and Virginia Railroad. Crossing the Cumberland River he surprised a body of 400 Confederates at Montgomery, Tenn., on the 17th, capturing 105 officers and men and a large amount of supplies. Avoiding the Confederates at points on the way, he struck the railroad at Lenoirs on the morning of the 19th, captured three guns and about 65 prisoners, burned the depot and other buildings, containing five guns, 2,500 stand of small arms and ammunition, and then destroyed the railroad to within a short distance of Knoxville. Leaving a regiment south of the city to demonstrate on it, Sanders, with the rest of the command, passed around the place during the night, struck the railroad north of it, burned the bridges and on the morning of the 20th made a strong demonstration on Knoxville by the Tazewell road. Artillery firing and skirmishing continued an hour, during which Sanders captured two guns, 30 prisoners and some horses, and then followed the railroad to Strawberry Plains, destroying all bridges, including one over the Holston 1,600 feet long, near which, after a sharp engagement with the bridge-guard, he took 140 prisoners, five guns and a train of cars loaded with supplies. At daylight 21 June he started up the railroad for the Mossy Creek bridge, destroying the road at several points, and also the bridge. Large quantities of stores and 120 prisoners were captured. He now left the railroad to return by Rogers' Gap, avoiding forces sent to intercept him. The gap was found blocked by fallen timber and guarded by infantry and artillery, and adjoining gaps were found similarly obstructed. With the enemy in his front and closing on his rear, he found but one way to escape, and that by a trail impassable for artillery. He abandoned his guns, after destroying them and their ammunition, and by a wood road moved through Smith's Gap, three miles from Rogers', driving a cavalry regiment from it, and after a hard march in the Cumberland Mountains, in which some of his men took wrong roads, he reached Boston, Ky., on the 23d with a loss during his raid of two killed, four wounded and 13 missing. He had captured 10

guns and 10,000 small arms and paroled 461 prisoners.

SANDERSON, John, American author: b. near Carlisle, Pa., 1783; d. Philadelphia, April 5, 1844. He was professor of Latin and Greek in the Philadelphia High School from 1836 until his death. With his brother he was author of *Biography of the Signers of the Declaration of Independence* vols. 1; 2, (1820), and was sole author of *Sketches of Paris* (1838); (London ed. *The Americans in Paris,* 1838).

SANDERSON, Julia, American actress and operatic singer: b. Springfield, Mass., Aug. 20, 1884. After attending the schools of her native city she made her debut with the Forepaugh Stock Company of Philadelphia, with which she remained for five years. In 1902 she appeared in *Winsome Winnie* at the Casino Theatre in New York, and later in *A Chinese Honeymoon.* She sang in *Wang,* with De Wolfe Hopper in 1904, and for several years appeared in vaudeville. She took the leading part in many light operas. For some years she was the star of the Sybil Company, appearing in various light operas and musical comedies in the principal cities with Donald Brian and Joseph Cawthorn. Other appearances were in *Rambler Rose* (1916–1918); *The Canary* (1918–1920); *Hitchy Koo* (1920–1921); *Tangerine* (1921–1923); *No, No, Nanette* (1925–1926); *Queen High* (1926–1927); and *Oh Kay* (1927–1928).

SANDERSVILLE, city, Georgia, Washington County seat; altitude 445 feet; on the Sandersville Railroad, 60 miles northeast of Macon. It is situated between the Oconee and Ogeechee rivers, in a fertile cotton region, and has a considerable export trade in cotton. It has cotton, lumber and paper mills. It was founded in 1796 and incorporated in 1812. Pop. (1950) 4,475.

SANDFORD AND MERTON, The History of, a famous book intended for juvenile reading by Thomas Day, published 1783–1789. Portraying English social ideas of its time, it is now regarded as a literary curiosity. It is named for two school boys whose adventures are related in sedate fashion. Morals are drawn from every incident of their daily lives and from the stories which they read in their lesson books. Not the least remarkable feature of the book is the polished language used by these children of six years of age, which was typical of the refinement advanced English culture of the period sought to instil in youth.

SANDINO, sän-dē'nō, **Augusto César:** Nicaraguan guerrilla leader: b. 1893; d. Managua, Feb. 21, 1934. He was the son of a coffee planter and was educated in the state schools, but little is known of his early life. In 1926 he joined the Liberal revolution with a force of some 800 men during the fighting with the Conservatives. In May 1927 the United States decided to intervene and to impose peace and disarmament on both sides, but the agreement negotiated at Tipitapa on May 3, 1927 was not recognized by Sandino, who refused to lay down his arms and retired to the mountains of northern Nicaragua, and there successfully defied all efforts by the United States Marines to capture him. When, on Jan. 3, 1933, the last marines were withdrawn from Nicaragua, Sandino and some 500 followers were still in defiant liberty, and had aroused the support of much of Latin America. On Feb. 2, 1933 Sandino made a peace agreement with President Juan Sacasa and with 100 followers embarked on a cooperative farming project on the Coco River. Subsequently, however, conflicts arose between his followers and the National Guard, and in February 1934 he went to Managua to discuss with President Sacasa means of terminating this friction. Sandino's assassination followed a dinner with the president; he and his brother Socrates, and two aides were seized by National Guardsmen, taken to the airport and shot. At first the blame was laid to "maladministration in the National Guard," but within a week a movement was under way to justify Sandino's execution. An offer of amnesty by the government in the interests of peace was accepted by most of Sandino's followers. Whether Sandino is regarded as a "bandit," the official United States view, or as a patriot, it is certain that his stand against intervention aroused anti-United States feeling in Latin America, which was only allayed with the institution of the Good Neighbor Policy by President Franklin Roosevelt.

SANDPAPER, an abrasive agent made by coating paper or thin cotton cloth with glue and dusting fine sand over it with a sieve. Sandpaper is intermediate between glass paper and emery paper in its action on metals, but is less energetic than glass paper in its action on wood.

SANDPIPERS, a collective term for the approximately 75 species comprising the family Scolopacidae. The group is related to other families of shorebirds, such as the plovers and the oyster-catchers, and, less closely, to the gulls, terns, and auks. The term "sandpiper" refers to the habits of these birds of running along sandy beaches uttering thin, piping notes. The vast majority of the members of the family Scolopacidae nest in the Northern Hemisphere. They are especially abundant in the far north where the numerous pools and abundant insect life of the arctic tundra during the brief northern summer provide them with ideal nesting conditions. The nest is usually a mere depression in the sand or grass. Four rather large and pointed eggs are laid. When arranged with the pointed ends together at the center of the nest they form a circle which the parent bird is just barely able to cover. Young sandpipers are long-legged, attractive little creatures, covered with buffy and yellowish down. They follow their parents as soon as they leave the shell and pick up their own food.

Sandpipers live mostly on small insects and other aquatic creatures. Their long legs and bills enable them to wade through shallow water and mud in search of their food. As a rule, they do not swim, though a few have the toes partially webbed or "semi-palmated," as it is called. The plumage of sandpipers is attractive but not brilliant. In general, the feathers are mottled with gray and brown to match the background of sand and marsh. During the nesting season a brighter plumage is usually acquired; the breast is then often reddish or chestnut. Unlike most birds the female sandpiper is in many species somewhat more brightly colored and larger than her mate. When this is the case, the female is often the more aggressive partner during court-

ship, while the male is left to perform most of the duties of incubation.

There are others, however, such as the pectoral sandpiper (*Erolia melanotos*) and the ruff (q.v.) in which the male is the larger and more colorful sex. Since the Arctic regions are entirely unsuitable for sandpipers during the long winter months, the northern nesters are birds of powerful flight. Many of them nest right around the Arctic region with little variation from continent to continent and in the autumn fly thousands of miles to the south to winter in southern Africa, Argentina, and even in the Hawaiian Islands, New Zealand, and Australia. Others are more hardy and winter on the seacoasts north to the latitude of Long Island or New Jersey. Most sandpipers are highly gregarious and move about in large flocks. These flocks may contain but a single species or several species of about the same size. In flight the members of a flock wheel and turn in perfect unison, as though guided by a single instinct. Sandpipers are good table birds, but their sociable habits and fearlessness permitted gunners to shoot unreasonable numbers. A number of species became very rare, and laws were passed protecting sandpipers throughout the year in Canada and the United States. In addition to the more typical sandpipers, the family Scolopacidae also contains some specialized or unusual types, such as the woodcocks, snipe, and curlews. These are sandpipers in the inclusive sense,

The commonest and best known sandpiper in North America is the spotted sandpiper (*Actitis macularia*). This bird is by no means restricted to the coast, but is found along almost every creek or pond on the continent. It is known to the farm boy as the "tip-up" because of its habit of teetering nervously up and down on its slender legs. This habit, shared by many species of birds which live along bodies of water, is thought to aid such species in judging distance. The spotted sandpiper is smaller than a robin, grayish above and white below, with black spots on the breast. These spots are lost during the winter and are absent at all seasons in the closely related common sandpiper (*A. hypoleucos*) of the Old World. Turning now to those species that nest in the far north and migrate or winter along our ocean beaches, one finds a number of species of small size, such as the least sandpiper (*Erolia minutilla*), the red-backed sandpiper (*E. alpina*), and the semipalmated sandpiper (*Ereunetes pusillus*). Some of these are no larger than sparrows and are most amusing and attractive as they run rapidly up and down the beaches following each receding wave in search of food. They are often known collectively as "peeps" and the bay gunner of a past generation would shoot large numbers of them to make "peep pie." Two related species, the purple sandpiper (*Erolia maritima*) of the North Atlantic and the rock sandpiper (*E. ptilocnemis*) of the North Pacific, are remarkable in that they are hardy enough to pass the winter along northern seacoasts and are only slightly migratory. Another large and well-known group of sandpipers is that comprising the genus *Tringa*. It includes among American species the solitary sandpiper, and the two species of yellowlegs, and in the Old World the redshanks, the greenshanks, and the green and wood sandpipers. These are birds of larger size. The greater yellowlegs (*T. melanoleucus*), for example, stands about a foot high. When feeding it dashes about very actively in shallow water in pursuit of minnows and aquatic insects. The species of this genus are often called "tattlers" because of their loud, piercing cries, which seem to warn geese and other waterfowl of the presence of a hunter. The solitary sandpiper (*T. solitaria*) migrates along inland streams and ponds. As it alights it has the habit, shared by some other shorebirds, of gracefully elevating its wings above the back and then quickly folding them. Unlike its relatives, the solitary sandpiper does not nest on the ground but prefers to lay its eggs in an old nest of a robin or some such tree-nesting bird. One of the finest species of American sandpipers is the Bartramian sandpiper (*Bartramia longicauda*) or "upland plover" as it is called, though it is not a true plover. It is a bird of grassy plains and fields, seldom seen along beaches. About 12 inches in length, it is handsomely marked with brown and gray. All the notes of this bird are musical. The call note is a bubbling warble, often heard as this bird migrates over at night. On the nesting grounds the upland plover mounts high in the air and, sailing on motionless wings, utters a long-drawn, haunting whistle. Such aerial songs or display flights are characteristic of a number of shorebirds. In winter the upland plover migrates all the way to the pampas of the Argentine. This species is a very close relative of the curlews. Some of the latter are as large as a chicken and are the largest members of the family Scolopacidae.

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SANDPOINT, city, Idaho, Bonner County seat; altitude 2,086 feet; on Pend Oreille Lake, an expansion of Clark Fork River; near the Kaniksu, and the Coeur d'Alene national forests in the Rocky Mountains; 68 miles northeast of Spokane, Wash.; on the Northern Pacific; Great Northern; and the Spokane International railroads; state and federal highways; and with a municipal airport. It is in a rich agricultural and timber region; has lead and silver mines; fishing interests; and lumber and shingle mills. Sandpoint is likewise a popular lake resort, famous for its superb scenery. Its name is derived from a white sand bar that extends into Pend Oreille Lake. The latter ranks among the largest fresh-water lakes wholly within the United States, having a shore line 111.3m. long, while its maximum depth is 1,200 feet. There is a public library; and near by, at Hope, is the David Thompson Monument, erected on the site of the first dwelling built in Idaho, in 1809. Hope was also visited by the Lewis and Clark Expedition in 1805. Pop. (1950) 4,265.

SANDRART, zän'drärt, **Joachim von,** German artist and art critic: b. Frankfort-on-Main, May 2, 1606; d. Nürnberg, Oct. 14, 1688. He studied painting and copperplate engraving under eminent painters and engravers at Utrecht. Subsequently he traveled throughout England, gaining court recognition and receiving art commissions from Charles I and from the duke of

Buckingham, and Italy (1627) where he became, at Rome, the intimate friend of Claude Lorraine. Among other pictures, he painted 'The Death of Seneca' for the king of Spain and a 'Nightpiece' in the style of Honthorst; besides furnishing the illustrations for 'Galeria Giustiniana' (1631). He executed under commission from Urban VIII several portraits and pictures for the churches in Rome and made a number of sketches in central Italy for M. Zeiter's 'Itinerarium Italiæ' and Gottfried's 'Archontologia Cosmica.' On his return to Frankfort he painted for Maximilian I of Bavaria in the gallery at Schleissheim 'The Twelve Months' and 'Day and Night.' He subsequently inherited the estate of Stockau, near Ingolstadt, assumed a title and henceforth gave a good deal of his time to art literature, painting also some portraits of the nobility. His masterpiece is 'The Company of Archers assembled to do Honor to Maria de Medici when she visited Amsterdam,' now in the town-hall of that city. But his works on art are so important that they have almost obscured his fame as a painter. These books include 'Deutsche Akademie der edlen Bau-Bild- und Malereikünste' (1675–79; critical edition by Sponsel 1896); 'Admiranda Sculpturæ seu Statuariæ Veteris' (1689), and 'Insignium Romæ Templorum Prospectus Exteriores et Interiores.'

SANDRINGHAM, sănd'rĭng-ạm, England, in Norfolk, seven and one-half miles northeast of Lynn, is an estate comprising 7,000 acres. It was purchased in 1862 by the Prince of Wales, later Edward VII, who erected a mansion in Elizabethan style as a country residence. It is surrounded by a charming park of 200 acres. The "Norwich gates," the dairy and the cottages are interesting features. The Germans made an aerial attack on Sandringham in January 1915.

SANDROCOTTUS, săn-drō-kŏt'ŭs, the Indian king to whom Megasthenes was sent by Seleucus Nicator, in 306, as his Ambassador. Megasthenes improved the opportunity to collect materials for his historic work in four books, 'Indica,' which is the most important work of Greek antiquity upon that subject. According to this author Sandrocottus reigned over the Gangaridæ and Prasii, nations of the Ganges Valley. After the death of Alexander he extended his dominion over the whole of northern India, subduing even the Macedonians whom Alexander had put in possession of the Indus Valley and the Punjab. Seleucus received 500 war elephants from the Indian conqueror on confirming the cession of this territory and left Megasthenes as his Ambassador at the courts of Sandrocottus. This monarch, originally a robber chieftain, may now safely be identified with Chandragupta, whose accession is celebrated in the Sanskrit drama 'Mudrarakshasa.' His capital was Pataliputra (Gk. Palibothra), modern Patna, a city situated in Bengal on the banks of the Ganges, and there he established the Mauryan dynasty. Consult Schwanbeck, 'Megasthenis Indica' (1846); Mulier, 'Fragmenta Historicum Græcorum' (1841–70); McCrindle, 'Ancient India as Described by Megasthenes and Arrian' (1877).

SANDS, Benjamin Franklin, American naval officer: b. Baltimore, Md., 11 Feb. 1811; d. Washington, D. C., 30 June 1883. He entered the navy as midshipman in 1828, was commissioned lieutenant in 1840 and served in the Mexican War. In 1851–59 he was engaged in the coast-survey service, receiving promotion to commander in 1855. In 1862 he was commissioned captain. In 1862–65 he was senior officer in command of the blockade off Wilmington, N. C., participated in both attacks on Fort Fisher, was in command of the blockade off the coast of Texas from February to June in 1865, and raised the flag at Galveston, the last post held by the Confederates. He was commissioned commodore in 1866, was superintendent of the naval observatory at Washington in 1867–73, commissioned rear-admiral in 1871 and placed on the retired list in 1874.

SANDS, Henry Berton, American surgeon: b. New York, 27 Sept. 1830; d. there, 18 Nov. 1888. He was graduated from the College of Physicians and Surgeons in 1856 and later studied abroad. On his return from Europe he became demonstrator of anatomy at the College of Physicians and Surgeons; in 1869 was appointed professor of anatomy and in 1879 professor of the practice of surgery, holding the latter position till his death. He was attendant or consulting surgeon for several different hospitals, but gradually gave up his hospital work to give his attention to a rapidly increasing private practice. He became one of the foremost surgeons of the city and was called for consultation in President Garfield's case. His publications include 'Aneurism of the Sub Clavian, treated by Galvano Puncture' (1869); 'Esmarck's Bloodless Method' (1875); 'Treatment of Intussusception by Abdominal Method' (1877); 'Question of Trephinery in Injuries of the Head' (1883), and 'Rupture of the Ligamentum Patellæ and its Treatment by Operation' (1885).

SANDS, Robert Charles, American poet and author: b. Flatbush, L. I., 11 May 1799; d. Hoboken, N. J., 17 Dec. 1832. He was graduated from Columbia in 1815, admitted to the bar in 1820, but devoted himself almost exclusively to literature. He established and edited in 1824 the *Atlantic Magazine*, which later became the New York *Review*, and in 1825–27 was associated with William Cullen Bryant in editing it. From 1827 until his death he was on the editorial staff of the *Commercial Advertiser*. He wrote with Bryant and Verplanck a series of essays published in the form of an annual, 'The Talisman' (1828–30), in which appears one of his longest poems, 'The Dream of the Princess Papantzin.' He also wrote 'Historical Notice of Herman Cortes' (in Spanish, 1828); 'Life and Correspondence of Paul Jones' (1831); 'The Dead of 1832' (poem, 1832), etc.

SANDS, William Franklin, American diplomatist: b. Washington, D. C., 29 July 1874. He was educated at Saint Michel, Fribourg, Switzerland, Stella Matutina College, Feldkirch, Austria, and Georgetown University, Washington, D. C. He was appointed second secretary of the American legation at Tokio, Japan, in 1896; became first secretary at Seoul, Korea, two years later and was chargé-d'affaires ad interim in 1899. From 1900 to 1904 he was adviser to the emperor of Korea, in 1905–07 was secretary and chargé at Panama, in 1907–

1908 in Guatemala and in 1908–1909 in Mexico. In 1909–1910, Mr. Sands was American Envoy Extraordinary and Minister Plenipotentiary to Guatemala. In the latter year he resigned to enter business. He served on the Prisoners' Relief Commission in Russia, 1916–1917. For his services to French citizens during the Boxer Rebellion he was made a Chevalier of the Legion of Honor.

SANDSTONE, consolidated sand. The grains of a sand, chiefly silica, may be compacted by pressure alone, forming easily workable free stone, but generally they are held together by some cement, as (1) iron oxide, which coats the grains and cements their adjoining portions, forming a brownstone; (2) silica, which fills in the interstices between the grains and generally causes secondary enlargement of each grain in such a manner that the new quartz forms a continuous crystal with the old quartz grain, the rock thus becoming a solid mass of crystalline quartz; (3) lime; or (4) clay, forming calcareous and argillaceous sandstones respectively. Impure quartz sandstones may be argillaceous, calcareous, feldspathic, glauconitic or micaceous, according to the admixture. When derived from unassorted disintegration products of crystalline (feldspathic) rocks, they are called arkosic. Sandstone composed wholly or in large part of comminuted coral or shell sand cemented by infiltrated calcium carbonate makes up extensive beds of plastic limestones to which the name sandstone is commonly applied by the quarrymen. Such lime-sandstones may analyze as high as 99.6 per cent calcium carbonate. Ordinarily the term sandstone is applied to quartz sandstones whether pure or impure.

Sandstone very commonly shows lines of stratification or bedding, where exposed in section, and a cross-bedding structure is very common, the various minor layers of a bed being inclined in different and often opposite directions. All sandstones of shallow water deposit may show ripple marks, rill marks, wave marks, and impressions and traces of various animals, while aeolian sandstones may show fine bedding and wind rippling together with great diversity in thickness. Among littoral deposits coarse sandstones are found between tide marks, fine in shallow water (less than 100 fathoms).

In the United States quartz sandstones are widely distributed geographically and geologically. Among the more important commercial deposits are the following: The Cambrian sandstone of New York (Potsdam sandstone), Wisconsin, Minnesota, Michigan (Saint Croix sandstones), and the Rocky Mountain region, as well as early Cambrian sandstones of the southern Appalachians; the Ordovician (Saint Peter's) sandstone of the upper Mississippi; Medina (Silurian) sandstones of New York and Pennsylvania; the Oriskany, Hamilton, and Portage (Devonian) sandstones of New York, mostly used for flagging purposes; the Waverly (Lower Carboniferous) sandstones of Ohio, which furnish the bulk of the whetstones and grindstones of the country; the Pottsville and lower coal measures of Pennsylvania and West Virginia; the red sandstones of the Connecticut Valley; New Jersey and Nova Scotia (Jura-Trias); and the Dakota sandstone of the West. Old Red Sandstone is the term applied to the continental (nonmarine) type of deposit formed during the Devonian era in Great Britain and Ireland. This consists of a mass of red sandstone shales and conglomerates from 10,000 to 16,000 feet in thickness and contains igneous rocks aggregating 6,000 feet thick near the middle. From it many remarkable fossil remains have been obtained. New Red Sandstone was a term used for red sandstone of the Triassic age in Great Britain.

Consult Ries, H., *Building Stones and Clay Products* (New York 1912); United States Geological Survey, *Mineral Resources of the United States* (Washington 1948).

SANDUSKY, săn-dŭs'kĭ, city, Ohio, Erie County seat, altitude 598 feet, is located on Sandusky Bay, Lake Erie, 60 miles west of Cleveland, on the New York Central; Pennsylvania; Baltimore and Ohio; and New York, Chicago and St. Louis railroads. It is a port of entry, an important shipping point for coal and sand, has two privately owned airports, and extensive lake fishery operations. It also has a thriving vacation and tourist business. The adjacent area is productive farmland, with vineyards and orchards providing quantities of grapes, peaches, pears, plums, and apples. The city is noted for its wineries. There are also large deposits of sand, gravel, clay, and limestone nearby.

Besides fishing, coal shipping, and wine-making, Sandusky manufactures more than a hundred nationally distributed products, including clay and cement products, paper, corrugated boxes, crayons, chalk, water colors, boats, castings, chain, food products, fertilizer, glues and pastes, radios, rubber goods, washing machines, farm and industrial machinery. A branch of Bowling Green State University is here, and the Ohio Soldiers' and Sailors' Home. A two-mile bridge across the bay connects the city with Marblehead Peninsula, and there is regular steamship service to the extensive recreation area of Cedar Point. The state has fish hatcheries at Put-in-Bay.

This lakeside area was explored early by the French. By 1749 English traders were frequenting the region, and in 1763 a fort was built—and was burned the same year by the Indians in the Pontiac Conspiracy. In 1813 Commodore Oliver Hazard Perry defeated the British in a naval action at Put-in-Bay, thus winning the Battle of Lake Erie in the War of 1812. In 1816 settlers from New England called the place Portland; in 1818 the enlarged plat was named Sandusky City; the second part of the name was dropped when urban incorporation came in 1845. It was made the seat of Erie County in 1838. Sandusky is a corruption of the Indian word meaning "at the cold water"—referring in this case to the cool springs nearby. In 1849 it experienced a serious plague of cholera. Through the '80s and '90s the city prospered. In 1916 Sandusky adopted commission government. Pop. (1940) 24,874; (1950) 29,375.

SANDUSKY, a bay indenting the northern part of Ohio, an inlet of Lake Erie. It is 20 miles long and five miles wide and forms an excellent harbor.

SANDWICH, sănd'wĭch, 4TH EARL OF, (JOHN MONTAGU), English politician: b. Nov. 3, 1718; d. London, April 30, 1792. He was educated at Cambridge, traveled extensively in the Mediterranean countries and in 1739 returned to England where he took his seat in the House of

Lords and became a political follower of the Duke of Bedford. He became Lord Commissioner of the Admiralty in 1744 and was shortly afterward appointed captain in the Duke of Bedford's regiment. His promotion in the army was rapid and at his death he was senior general on the list. He was appointed Ambassador to Madrid in 1763, but before he could depart on his mission he was made one of the principal secretaries of state. While in this office he took part in the famous prosecution of John Wilkes. In 1768 he became Postmaster-General and in 1771 was nominated first lord of the admiralty, an office he held for 11 years. His own gain and party interest were made of paramount importance and to the insufficient equipment of the navy was justly laid much of the disaster which the British navy encountered in those years. His administration was on the whole disastrous; his immoral private life was revealed by the murder of his mistress, and perhaps no man of the 18th century was held in more bitter contempt in England. He lived a practically retired life after 1782 and is the reputed inventor of the sandwich as a timesaver for his gambling propensities.

SANDWICH, town and cinque port, England, Kent County, is located on the Stour River, 12 miles east of Canterbury. It has a tannery and a cereal factory. The tower of St. Clement's Church is an example of early Norman architecture, and there are extensive Roman remains. Pop. (1951) 4,142.

SANDWICH, city, Illinois, De Kalb County, altitude 657 feet, is located 56 miles southwest of Chicago, on the Chicago, Burlington and Quincy Railroad. It has manufactures of farm implements, corn elevators, vacuum pumps, work clothing, dairy products, airplane radio crystals, and burial vaults. Pop. (1950) 3,027.

SANDWICH, town, Massachusetts, Barnstable County, altitude 15 feet, is located on Cape Cod Bay, 62 miles southeast of Boston, on the New York, New Haven and Hartford Railroad. This typical old Cape Cod community was first settled in 1637, and was incorporated in 1639. Its chief industry is the cultivation of cranberries. It holds a unique place in the American manufacture of fine colored glass. For more than half a century, beginning about 1825, Sandwich artisans made glass by methods of which the secret has been lost. The town has a museum with relics of early Cape Cod life and customs, and a fine collection of old locally made glassware. Pop. (1950) 1,007.

SANDWICH, town, New Hampshire, Carroll County; altitude 800 feet, is located 45 miles northwest of Dover, with bus connections with the Boston and Maine Railroad at West Ossipee. Sandwich is a tourist resort in a region of farm and forest. Here in 1926 was founded the first home industry unit of handicraft articles for which New Hampshire is noted. Two of John Greenleaf Whittier's poems concern Sandwich—his *Sunset on the Bearcamp* and *Voyage of the Jettie.* Pop. (1950) 615.

SANDWICH, town, Ontario, Canada, in Essex County; since 1935 a residential section of the city of Windsor, on the Detroit River, opposite the city of Detroit, Mich. It was first settled by the French as L'Assomption.

SANDWICH BAY, Canada, inlet on Labrador's southeast coast, 30 miles long and 10 miles wide at the entrance. Here are several lumber hamlets, including Cartwright (pop. 183).

SANDWICH ISLANDS. Old name for the Hawaiian Islands.

SANDY HILL, N. Y. See Hudson Falls.

SANDY HOOK, N. J., a low, sandy peninsula in Monmouth County, about 18 miles south of New York. It begins at the Navesink Highlands and extends north six miles; its width is less than a mile. On the west side of the peninsula is Sandy Hook Bay. At the northern extremity is a beacon light, and about a mile south of this point is a lighthouse 90 feet in height. At the outermost point is Fort Hancock. On the peninsula is a government proving ground for ordnance and armor plate.

SANDYS, sändz, Sir **Edwin,** English statesman and colonist, second son of Edwin Sandys, archbishop of York: b. Worcestershire, Dec. 9, 1561; d. October 1629. He was graduated at Corpus Christi College, Oxford, in 1579. He first entered parliament in 1586 as a member for Andover. He became a supporter of James I, upon whose coronation in 1603 he was knighted. He was a member of the king's first Parliament, and in 1619–1620 he was treasurer of the Virginia Company, which he ably promoted, and continued his interest in the colony's affairs until his death. He was in his later years suspected of sympathy with the Parliamentary cause, but retained the favor of the king.

Consult Brown, A., *The First Republic in America* (Boston 1898); Fiske, J., *Old Virginia and Her Neighbours* (Boston 1900).

SANDYS, George, English poet, traveler and Virginia colonist, brother of Sir Edwin Sandys (q.v.): b. Bishopsthorpe, Yorkshire, March 2, 1578; d. Boxley, near Maidstone, Kent, March 4, 1643 or 1644. He studied at Oxford and later traveled in France, Italy, Turkey, Egypt, and Palestine, writing an account of his journeys which was of considerable ethnological and geographical value. He was appointed treasurer of the Virginia Company in 1621, succeeding his brother, Sir Edwin, and sailed for Virginia soon afterward. He built the first water mill there and established shipbuilding and iron works. He was treasurer until 1625 and was appointed a member of the council in 1624, and again in 1626 and 1628. In 1631, after some controversy concerning his alleged infringements of the rights of other settlers, he returned to England. While in Virginia he completed his translation of the first 10 books of Ovid's *Metamorphoses* (1626), the first work of the sort accomplished in America, and upon which his reputation as a poet largely rested. He was also author of *A Paraphrase upon the Psalms of David and upon the Hymnes Dispersed throughout the Old and New Testaments* (1636); and of *A Paraphrase upon the Song of Solomon* (1641). He also translated Hugo Grotius's *Christ Passion* from the Latin (1640).

SANFORD, săn'fẽrd, **Edmund Clark,** American psychologist and college president: b. Oakland, Calif., Nov. 10, 1859; d. Worcester, Mass.,

Nov. 22, 1924. He was educated at the University of California (1883) and at Johns Hopkins University, where he held a fellowship 1887–1888. He taught at Oahu College in Honolulu, Hawaii, 1883–1885, and in 1889 joined the faculty of Clark University, Worcester, where he was professor of expermiental and comparative psychology 1900–1909. From 1909–1920 he was president of Clark College, but resigned in 1920 to rejoin the faculty of Clark University as professor of psychology and education, a position he held until his death. From 1895 he was joint editor of *The American Journal of Psychology*, and in 1902 was president of the American Psychological Association. He was author of *A Course in Experimental Psychology* (1898).

SANFORD, Edward Terry, American jurist: b. Knoxville, Tenn., July 23, 1865; d. Washington, D.C., March 8, 1930. He was educated at the University of Tennessee (1883), Harvard University (1885; 1889), and held honorary degrees from both Harvard and Cincinnati. He was admitted to the Tennessee bar in 1888, was Assistant Attorney General of the United States, 1907–1908, United States District Judge for the Eastern and Middle District of Tennessee, 1908–1923, and was appointed an Associate Justice of the United States Supreme Court in 1923. He held this office at the time of his death.

SANFORD, Henry Shelton, American diplomatist: b. Woodbury, Conn., June 15, 1823; d. Healing Springs, Va., May 21, 1891. He was educated at Washington (now Trinity) College, Hartford, and at Heidelberg University. In 1847 he entered the diplomatic service and became attached to the Saint Petersburg legation. The next year he was acting secretary to Andrew J. Donelson at Frankfort and during 1849–1854 secretary of legation at Paris. He was United States Minister to Belgium, 1861–1869, and rendered service of great importance during the Civil War. He negotiated the Scheldt Treaty of navigation and commerce. In 1877 Leopold II of Belgium appointed him to the executive committee of the Association for the Exploration and Civilization of Central Africa; and in 1885 he was one of the signers for the United States of the General Act of the Conference of Berlin which established the status of the Congo Free State. On July 2, 1890, at Brussels, he was a signer of the General Act by which the United States and other powers agreed to suppress the slave trade and restrict the commerce in arms and liquor in Africa. From 1870 he made his home on his plantation on the St. John's River in Florida.

SANFORD, city, Florida, Seminole County seat, is located on Lake Monroe and the St. John's River, 20 miles northeast of Orlando, on the Atlantic Coast Line Railroad. It is the leading celery market of Florida, packs and ships citrus fruit, and has manufactures of cement products. It is the outgrowth of Mellonville, a trading post established in 1837 near a frontier fort. In 1870 Henry Shelton Sanford (q.v.) bought 12,000 acres of land here, including the townsite, and the city was named in his honor. Pop. (1950) 11,935.

SANFORD, town, Maine, York County, altitude 310 feet, is located on the Mousam River, 35 miles southwest of Portland, on the Sanford and Eastern Railroad. The chief industries are the manufacture of upholstery and drapery fabrics, palm beach cloth, shoes, yarn, dress goods, and lumber. There is a high school, established in 1874; two public libraries which were founded by library associations in 1898 and became free public libraries in 1900; and a town hall.

The land was purchased from the Indians in 1661 and the project of laying out a town was formed as early as 1676, but no permanent settlement was made until 1730, the exact date being uncertain. The place was first called Phillipstown in honor of Major Phillips of Boston, original grantee. It was incorporated in 1768 and named for Major Phillips' stepson, Peleg Sanford, governor of Rhode Island. Industrial development started in 1867 when a factory began making carriage robes and blankets. The town of Sanford also includes the village of Springvale. The government is a representative town meeting membership administered by a board of selectmen. Pop. (1950) 15,177.

SANGALLO, säng-gäl'lō, **Antonio da,** Italian architect: b. Florence, 1455; d. there, 1534. He built in Montepulciano the church of the Madonna di San Biagio; the palaces Cervini and Bellarmini; in San Savino the palace of the Cardinal di Santa Prassede; in Arezzo the church of the Annunziata; and the citadel in Civita Castellana.

SANGALLO, Antonio da (Cordiani), Italian architect, nephew of the preceding: b. Mugello, near Florence, 1483?; d. 1546. He designed and built the church of Madonna di Loreto, at Rome; the Porta di San Spirito; the church of San Spirito; the palace Sacchetti; the palace Farnese. He also enlarged the Vatican and executed the famous fountain at Orvieto.

SANGALLO, Giuliano da (Giamberti), Italian architect (brother of Antonio the Elder): b. Florence, 1445; d. there, 1516. At Florence he built the monastery of Santa Maria Maddalena de Pazzi and the Palace Condi; in Prato, the church of Madonna delle Carceri; in Cajano, the Villa Poggio for the Medici. He constructed the fortress at Ostia; the façade of Santa Maria dell Anima in Rome; the monastery of San Pietro in Vincoli, and the flat roof of the church of Santa Maria Maggiore. He also built Pisa's citadel.

SANGAMON, săng'gà-mŭn, a river of Illinois, with headwaters in Champaign and McLean counties. It flows southeast to Sangamon County where it unites with the south fork of the river, and changes the direction of its course, flowing northwest, then west, then northwest and enters the Illinois River by two channels. Total length, 225 miles. The confluence of the main stream (north fork) and the south fork is six miles east of Springfield and the mouth of the river is about 44 miles west-northwest of Springfield.

SANGER, săng'ĕr, **Joseph Prentice,** American soldier: b. Detroit, Mich., May 4, 1840; d. March 15, 1926. He was educated at the University of Michigan and at Bowdoin. He served in the Civil War, being successively second lieutenant of the First Michigan Infantry, second lieutenant of the First United States Artillery and after October 1861 as a first lieutenant he was attached to a battery of light artillery.

He was wounded and was twice brevetted for gallantry; was orderly officer to President Lincoln for a short time in 1862, and after the war was adjutant of his regiment. He took part in the expedition against the Fenians in 1866. In 1872–1875 he was professor of military science, tactics and law at Bowdoin and in 1874 was admitted to the bar at Portland, Me. He was detailed to accompany General Upton on a tour of inspection of the armies of Japan, China, Persia, India, Turkey, Italy, Russia, Austria, France, and England in 1875–1877. In May 1898 he was made brigadier general and in 1899 was assigned to command the department and subsequently the district of Matanzas, Cuba. Subsequently he was made director of the census of Cuba and Puerto Rico; in 1901–1902 was inspector general and chief of the staff, director of the Philippines, director of the Philippine census in 1902; became major general in 1904 and was retired the same year. In 1910 he was a member of the Brownville court of inquiry.

SANGER, săng'gẽr, **Margaret,** American birth control propagandist: b. Corning, N. Y., Sept. 14, 1883. After studying in the schools of her native town, and at a nurses' training school, she undertook, in 1915, the publication and editorship of the *Woman Rebel,* later the *Birth Control Review,* organ of the American Birth Control League. Her aggressive advocacy of birth control brought her in frequent conflict with the law prohibiting the circulation of matter relating to it through the mails, and she was several times arrested, but never convicted. She traveled widely in the United States and abroad in the interest of birth control and wrote much on the subject. Her books include: *The Case for Birth Control* (1917); *Woman and the New Race* (1920); *The Pivot of Civilization* (1922); *Motherhood in Bondage* (1928); *My Fight for Birth Control* (1931); *Margaret Sanger: An Autobiography* (1938).

SANGIHE, säng'ê, or **SANGIR** or **SANGI ISLANDS,** Malay Archipelago, a group midway between northeastern Celebes and the southern point of Mindanao in the Philippine Islands. The largest islands of the group are Groot (Great) Sangihe, Siaoe and Tagoelandang. Groot Sangihe, the most northerly, contains the volcano of Awoe (4,000 feet), whose eruptions in 1812, 1856, and 1892 caused great destruction and loss of life. All the islands are mountainous, partly volcanic and well cultivated. Clouds of sulphur constantly issue from the craters of volcanoes on Siaoe and Roang, and earthquakes are frequent. Chief products are rice, pisang, sago and cocoanut oil. Edible birds' nests abound in the smaller islands. Exports of copra, rattan, and heavy woods continue, but export of nuts and nutmegs has shrunk to virtually nothing on account of tree diseases. The Malay natives became Moslems in the 15th century and were converted to Christianity by the Portuguese. Most of them are Protestants. The islands are a part of the Netherlands-Indonesian Union. Schools are managed by the Sangihe and Talaud Committee, a missionary society. Pop. (1930) 134,904.

SANGRAAL, săng-grāl'. See GRAIL, THE HOLY.

SANGRE DE CRISTO, sän'grā dā krēs'tō, a range of mountains in the south central part of Colorado. See ROCKY MOUNTAINS.

SANGSTER, Charles, Canadian poet: b. Kingston, province of Ontario, July 16, 1822; d. 1893. He was self-educated, and in 1849 became editor of the Amherstburg *Courier,* but shortly afterward returned to Kingston and engaged in journalism there. He was employed in the Post Office Department at Ottawa in 1868–1886. His verse received favorable notice both in America and England, and the highly patriotic character of it is credited with greatly advancing the cause of confederation in Canada. Author of *Saint Lawrence and the Saguenay* (1856); *Hesperus and Other Poems* (1860).

SANGSTER, Margaret Elizabeth Munson, American writer: b. Munson, N. Y., Feb. 22, 1838; d. Glen Ridge, N. J., June 4, 1912. In 1871 she became associate editor of *Hearth and Home;* 1873–1879, editor of *The Christian at Work* and in 1889–1899, editor of *Harper's Bazaar.* After 1899 she was staff contributor to the *Ladies' Home Journal.*

SANGSTER, Margaret Elizabeth (Mrs. Gerrit Van Deth), American writer: b. Brooklyn, N. Y., Sept. 27, 1894. She was educated in private schools, and in 1913 became associate editor of the *Christian Herald.* In 1918 she visited Belgium, Germany and France as correspondent for this magazine. She wrote much in prose and verse, including *Friends o' Mine* (1913); *Real People and Dreams* (1914); *Cross Roads* (1919); *The Island of Faith,* novel (1921); *Your Book and Mine* (1923); *Five Thousand a Year* (1924); *The Hill of Ambition* (1925); *The Youngest Thief* (1930); besides contributions to magazines.

SANGUINARIA, săng-gwĭ-nā'rĭ-ȧ, a monotypic genus, the bloodroot of the family Papaveraceae, indigenous to eastern North America and often cultivated for ornament. It prefers sheltered places in woods, where it can grow in leaf-mold. The thick, palmately lobed leaf is lapped around the bud, which swiftly outgrows its protector, loses its two fugacious sepals and opens into a star-shaped flower with several fleshy white petals and a mass of golden stamens in the centre. The flower closes again at night or on shady days, since it blooms in the earliest, cool days of spring. The leaves continue to grow during the summer and become nearly seven inches long. The seeds are contained in spindle-shaped capsules. The whole plant is very brittle and succulent and when broken, especially at its thick, fleshy rootstock, an acrid red juice flows copiously forth. This juice has caused the plant to be called bloodroot, and it was considered, by the doctrine of signatures to be a cure for blood diseases; later it becomes officinal as a cathartic, emetic and expectorant. The sanguinaria is also called red puccoon or Indian paint, because the aborigines used it as a stain for their skins and as a dyestuff.

SANHEDRIN, săn-hē'drĭn, a Jewish court of justice, especially the supreme judicial tribunal of the Jews, existing in and before New Testament times. According to rabbinical tradition the institution of the Sanhedrin is to be traced to the time of Moses and the events

mentioned in Numbers 11:16, 17, but this view is now generally rejected, and the time of its institution referred to a much later date. The most probable opinion is that it consisted of 71 members, including the president. From incidental notices in the New Testament we learn that the members were drawn from three different classes: "the chief priests," consisting partly of those who had previously filled the office of high-priest and partly of the heads of the 24 classes into which the priests were divided; "the elders of the people," that is, the heads of tribes and family associations; and "the scribes," or those learned in the law. The Sanhedrin sat originally within the temple precincts every day from the conclusion of the morning sacrifice until the evening sacrifice; excepting on Sabbaths and festivals. At its head was a president, who bore the honorable title of *nasi* or *prince*. The jurisdiction of the Sanhedrin, as the supreme tribunal of the Jews in civil as in ecclesiastical matters, was very extensive. It was the final court of appeal from all inferior courts; and, in addition to this, it alone had the right of judging in matters affecting a whole tribe, of determining questions of peace or war, of trying the high-priest or a disobedient member of its own body. It pronounced also upon the claims of prophets and upon charges of blasphemy. Its jurisdiction was not confined to Palestine, but extended to every place where the Jews had settlements (Acts 9:2). According to the Jerusalem Gemara, the power of inflicting capital punishment was taken away from this tribunal 40 years before the destruction of Jerusalem, and this accords with the answer of the Jews to Pilate (John 19:37), "It is not lawful for us to put any man to death." It might indeed pass sentence of death, but it required the confirmation of the Roman procurator before such sentence could be executed. The forms of procedure in the court seem to have been characterized by a general spirit of fairness. Different kinds of evidence were carefully weighed, and the agreement of at least two witnesses was necessary to procure a sentence of condemnation. A majority of the full membership was sufficient for a sentence. The place of meeting of the Sanhedrin was eventually changed to a portion of the court of the Gentiles, and, after several other changes, its seat was finally established at Tiberias. Besides the great Sanhedrin there were also inferior courts or lesser sanhedrins in the country towns, composed of persons of the same classes, and in contradistinction to these, the metropolitan council was termed the Great Sanhedrin. After the destruction of Jerusalem by the Romans these courts were abolished. Napoleon I convened a court under the name Sanhedrin, and it established 12 legal principles for the government of Jews in France. This was also called the Assembly of Notables and was dissolved in 1897. Consult Tama, *Transactions of the Parisian Sanhedrin* (London 1807).

SANHITA, săn'hĭ-tä, the Hindu designation of that part of the sacred writings of the Brahmins, which contain the mantra or hymns.

SANIDINE, or **GLASSY FELDSPAR,** an important rock-forming mineral. It is a variety of orthoclase, is found in tabular or square-prismatic crystals, often Carlsbad twins, frequently vitreous in appearance. It occurs only in the recent eruptive rocks such as obsidian, phonolyte, trachyte and rhyolite. Its best-known locality is the Drachenfels, Germany.

SANITARY ENGINEERING, the branch of engineering dealing with the promotion and conservation of the public health, comfort, and convenience by the control of the environment. Specifically, it deals with water supply, sewerage, stream pollution, sewage and industrial waste treatment, swimming pools, natural bathing areas, refuse collection and disposal, milk sanitation, sanitation of eating and drinking establishments, shellfish sanitation, insect control, rodent control, rural sanitation, air pollution, and plumbing.

The definition of sanitary engineering and the list of sanitary engineering activities indicate the sanitary engineer's need for a broad education based on a firm engineering background, broadened with biology, bacteriology, chemistry, hydraulics, modes of transmission and methods of control of disease, epidemiology and vital statistics, and crowned by professional courses specific for sanitary engineering such as water supply, insect control, and restaurant sanitation. It becomes more difficult to obtain a satisfactory sanitary engineering education in a four-year undergraduate course as the field of sanitary engineering broadens and the educational requirements expand. Although many engineering schools grant bachelor of sanitary engineering degrees, the present tendency is toward granting advanced degrees in sanitary engineering to graduates of a four-year engineering curriculum after they have completed at least one year of postbachelor study.

Sanitary engineering may be divided into four general lines of activity. The first includes planning, design, and construction. This line of activity is the province of consulting sanitary engineers, certain governmental agencies, and engineering organizations of some large corporations. The specific function of this group is to plan, design, and supervise the construction of structures and equipment which will accomplish the desired result at the least possible cost. A second activity is operation, which consists of operating sanitary engineering structures or programs, such as sewage treatment plants, water works, swimming pools, and rat and insect control programs. This group is usually employed by governmental agencies since most sanitary engineering works are owned and operated by cities, states, or the federal government. Industries are also constructing a considerable number of sanitary engineering works and are employing sanitary engineers to operate them.

The third line of activity is supervision and regulation. Almost all sanitary engineering works and programs are under the supervision of some governmental agency because of the great public stake in these activities. This group of engineers usually has no responsibility for the results obtained, but is responsible to determine what results are obtained, to evaluate the results, to promote improvements and to require, if necessary, the responsible person to take action to secure satisfactory results. This group depends on education for long-time results and has been responsible for many sanitary engineering improvements. There is a growing group in industry which performs this same function for management.

The three groups defined by their lines of activity, effectively assisted by the fourth group

consisting of the sanitary engineering equipment and material industry, comprise the team responsible for the high degree of sanitation now enjoyed by this country and many other nations.

Public Water Supply.—This refers to the collection, treatment, and conveyance of a bacteriologically safe and physically and chemically satisfactory water to domestic, commercial, and industrial consumers who require or can use water fit for human consumption. Standards for drinking water used by interstate carriers have been established by the United States Public Health Service and are generally accepted as minimum standards for drinking water throughout the United States. These standards specify the maximum number of coliform bacteria, and maximum concentrations of minerals, color, turbidity, tastes, and odors. Coliform bacteria are harmless bacteria normally found in the human intestine, and are used as indicators of fecal pollution.

Public water supplies may be privately or publicly owned. The cost of collecting, treating, and conveying the water is usually borne by the consumer in the form of a charge for the volume of water used.

Water can be obtained from under the ground or from the earth's surface. The source of all water is the rainfall. The quantity of water taken from underground and surface supplies over a period of years cannot exceed the rainfall (after deducting losses such as evaporation, transpiration, runoff and seepage).

Ground water is normally clear, cool, tasteless, odorless, bacteria-free, harder, and more highly mineralized than surface water. It is often bacteriologically safe, and chemically and physically satisfactory for domestic use as it comes from the ground, and is a valuable source of public water supply, especially in small towns. Ground water is sometimes too hard, and too highly mineralized for domestic consumption.

Surface water may vary from a clear, colorless, odorless, bacteria-free, soft, and slightly mineralized water, to one that is so turbid, colored, and highly polluted by sewage, and industrial wastes that it is practically impossible to make it into a safe, satisfactory drinking water. In general, it can be said that surface waters in populated areas will be contaminated and will require treatment to make them safe for drinking. This difference in surface waters results in a search for surface water supplies that are safe and satisfactory for use without treatment. Inasmuch as sources of water of this type are usually far removed from the desired point of use, an economic study usually has to be made to determine whether it will be less expensive to treat a nearby source, or to go farther away to a supply that will not have to be treated, but will have to be conveyed long distances.

Chemical coagulation, settling, filtering, and disinfection is a common form of treatment for removing color, turbidity, and bacteria from drinking water. Chemical coagulation consists of adding to the water small amounts of harmless chemicals which react with each other or the minerals in the water to form a light, feathery floc (precipitate) which is kept suspended for approximately 30 minutes and collects to itself most of the turbidity and considerable portion of the color and bacteria. The chemicals most commonly used for this purpose are alum (aluminum sulfate) and lime (calcium oxide or calcium hydroxide). The water then passes through a settling basin in which most of the floc with its collected impurities settles. After settling, the water is passed through a rapid sand filter, which removes the remaining suspended material. The water is now ready for disinfection which usually is accomplished with chlorine, in the United States. Ozone is used in certain parts of Europe, and will be used in one of Philadelphia's reconstructed water-plants. Many other water treatment processes are used, but this one serves to illustrate the principles involved.

Historically, the Chinese knew of the clarifying powers of alum many years ago. The slow sand filter was the first of the modern water purification processes and for many years in the 19th century was the only purification process available. The slow sand filter consisted of a three-foot bed of fine sand through which the water percolated at a slow rate. The slow sand filter is very efficient in the removal of turbidity and bacteria, but requires such large areas of filters that it is not economical.

Hardness is a measure of the amount of calcium and magnesium present in the water, and represents the soap-consuming characteristic of the water. It is necessary to remove hardness before the soap will act as a detergent. This can be done with soap, and results in the formation of scum on water. It can also be accomplished in water treatment plants at a much lower cost if the water is excessively hard. The problem of hard water softening has been partly solved by the introduction of chemical detergents which neither form scum nor are wasted in softening the water.

Water, after necessary treatment and pumping, is conveyed to the consumer through pipes called a distribution system. A pressure of 70 pounds per square inch is desirable in the distribution system in order to supply water to five-story buildings, and for fire protection. It is interesting to note here that, although the total amount of water used in fighting fire is negligible over the period of a year, the portion of the cost of the distribution system chargeable to fire fighting may be as high as 75 per cent. This is due to the fact that fire departments demand large quantities of water in cities. The distribution system costs chargeable to fire protection are often paid as a hydrant rental fee from general taxes to the water company or department. Fire protection is a reasonable charge against the property owners, rather than the water consumers.

Water distribution systems also include reservoirs which are used to permit economies in the operation of pumps and treatment plants, and to provide an emergency supply that can be used in case of a breakdown of equipment. In this connection, it should be emphasized that public water supplies must provide safe water, and they must be dependable.

The standards for industrial water are variable, depending on the industrial process, and are sometimes the same, or less strict than drinking water standards (in which case the public water supply is satisfactory). In instances where the drinking water does not meet the industrial water standards, it is usually too highly colored, too highly mineralized, too hard, or contains minute traces of chemicals that react unfavorably in the industrial process. Industries requiring water with special characteristics must give the municipal water more treatment or develop supplies of their own that meet their special requirements.

Sewerage.—Sewer systems are the systems of pipes and appurtenances which carry waste water to a point of disposal. They may be either separate or combined. The separate sewer system has two systems of pipes, the sanitary sewer, and the storm sewer. The sanitary sewer carries sanitary sewage which is composed of domestic sewage (from homes), commercial, and industrial sewage. The storm sewer carries surface water run off and roof drainage. The combined sewer system has only one system of pipes (called a combined sewer) and carries sanitary sewage, surface water run off and roof drainage. Sewers also carry infiltration water which seeps in through joints and breaks in the sewer. The separate sewer system is recommended since it avoids difficulties of disposal inherent in the combined system, unless future disposal requirements can be met, and there is a significant economic advantage in the construction of combined sewers. Some states have made it unlawful to construct combined sewers. Sanitary sewers are at least eight inches in diameter and are designed to produce a minimum sewage velocity of two feet per second. Sewage is 99.95 per cent water, and is considered as water for hydraulic computations. Sanitary sewers are at least eight feet underground in order to receive basement drainage by gravity. Sewers usually start on the highest ground and follow streets down natural slopes to the point of disposal. The sewer system resembles a great tree with its roots at the point of disposal and its branches spreading to reach sewage at outlying points. Although sewers are intended to flow by gravity, topography sometimes requires that the sewage be pumped to save deep trench excavations or to transfer the sewage to an adjacent watershed. The most common appurtenances in a sewer system are manholes which are used to gain access to the sewer, especially for cleaning.

Sewers are constructed to carry away the liquid wastes of the community and, in general, all wastes are accepted. Some exceptions must be made in order to prevent explosions, corrosion, clogging of sewers, and insurmountable difficulties in treating the sewage. A partial list of materials commonly excluded from the sewers includes mineral oil, grease, inflammable liquids (such as gasoline and naphtha), sand, cinders, highly acid materials, and high concentrations of copper and cyanides.

Stream Pollution Abatement.—Stream pollution is any degradation of stream waters by run off from inhabited areas, eroding soil, sanitary sewage, industrial wastes and, in fact, by any liquid or material not naturally present in the stream. The word stream is used to represent any natural water. Stream pollution produces many effects.

The numbers of fecal bacteria will be increased by the sanitary sewage, sometimes by industrial wastes and, to a lesser degree, by storm sewage and run off from inhabited areas. This pollution can make the stream dangerous for water supply, swimming, and for shellfish culture.

The dissolved oxygen in the stream is reduced, as bacteria and biological life use dissolved oxygen, when they oxidize unstable compounds in the stream. The rate of use of dissolved oxygen is chiefly a function of the amount of pollution present and the temperature of the water. The stream resists the reduction of the dissolved oxygen by its ability to take oxygen from the atmosphere, and by the ability of various water plants and microorganisms to give off oxygen to the water as they grow. The most serious oxygen reduction usually occurs in the summer when the rate of use of the oxygen is the greatest and the rate of absorption from the atmosphere is least. The ability of a stream to replenish its dissolved oxygen is strictly limited and can be exceeded easily. The reduction of dissolved oxygen has two principal effects: first, the death of fish as the dissolved oxygen is reduced to fifty per cent of maximum; second, the production of hydrogen sulfide and other odors by anaerobic bacteria, which is not usually noticed until the oxygen is depleted.

Stream pollution may produce sludge banks which are formed by the settling of suspended solids near the point of pollution. Anaerobic bacteria act on the sludge bank material with the formation of methane, carbon dioxide, hydrogen sulfide, and other noxious gases. Bubbles and sludge may be observed rising to the surface when digestion is at a peak during warm weather. Other effects of stream pollution are nuisances created by noisome floating objects, grease on beaches, discoloration of water, destruction of all stream life, toxic pollution, and destruction of boat hulls by action of acid wastes.

Natural purification forces, in addition to reoxygenation, are settling, bacteriological and biological action, and dilution. Natural purification is sufficient to eliminate the effects of any degree of pollution providing the stream is long enough and is not recontaminated. This process may involve miles of stinking, useless water if the pollution is severe. Such pollution should not be allowed to occur and, if it exists, it should be abated. If pollution is to be abated, what standards of stream condition should be established? This question cannot be answered without studying carefully the specific location under consideration, but general principles can be given. The problem is the allocation of stream resources between its various uses, such as water supply, irrigation, swimming, fishing, boating, water power, recreation, and the disposal of sewage and industrial wastes. The difficulty of determining the relative value of the various stream uses, and the fact that considerable use of the stream for sewage and waste disposal can be made without interfering with other stream uses, has resulted in stream standards being set so that stream pollution will not interfere with any other stream uses. This general rule is modified in industrial and metropolitan areas by the fact that it is financially impossible to recover some of the stream uses which have been lost. This is especially true in metropolitan areas served by combined sewers which overflow at each rain and send slugs of pollution downstream. It is true that some industrial wastes cannot be treated economically at present. The modification of the general rule results in grading of streams by stream pollution abatement authorities into various classifications which represent the highest use that can be expected for each stream after all practical steps have been taken to eliminate pollution. It is characteristic of these standards that they tend to rise as new methods of eliminating pollution become available, and the public demands, and willingness to pay for pollution abatement increases. Abatement of pollution requires large amounts of money and will take years to accomplish.

Power to control pollution abatement has rested entirely with the individual states. They have set up authorities consisting of representatives of public health, conservation, agriculture, the public, and industry. Action by these authorities is often necessary to secure pollution abatement since the industry or municipality causing pollution does not necessarily benefit by its abatement. The benefits accrue to their downstream neighbors. It has been established, however, that the industry or municipality causing pollution is responsible for its abatement. Most states have now halted the increase in stream pollution and are gradually reducing existing pollution. A bill passed in the 1948 session of Congress gives the United States Public Health Service power over pollution of interstate waters.

Sewage Treatment.—This is a pollution abatement process placed between the sewers and the stream so that the sewage will not pollute the stream beyond the limits allowed by stream standards. If the stream is large, and the pollution relatively small, there is no need for treatment. On the other hand, if the pollution is relatively great, and the receiving stream small, a high degree of treatment may be required and can be provided. Any treatment in addition to the minimum required by stream standards results in unnecessary expense. Stream standards have a tendency to become more rigid with time, so that provisions should be made for adding treatment units as required with a minimum of expense. Sewage treatment is usually divided into primary treatment, secondary treatment, and disinfection.

Primary treatment consists of screening to remove large materials, grit channels to remove sand, gravel, fruit pits, and so forth, and settling, and floatation to remove suspended materials. Screening and grit removal are used to prevent damage to equipment and clogging of pipes, and actually remove very little polluting material from the sewage. Settling is very effective in removing suspended solids which will settle or float. Settling is accomplished by flowing sewage slowly through a settling tank. The sewage remains in the tank for one to four hours. Primary sludge is removed from the bottom of the tank, floating material is skimmed from the surface and the remaining liquid flows on to disposal or additional treatment. Primary treatment will remove about 60 per cent of the suspended solids and 30 per cent of the oxygen demand.

Further reduction of suspended solids or oxygen demand is provided by *secondary treatment*, which is an oxidation performed by bacteria and microorganisms in the presence of dissolved oxygen. Three common types of secondary treatment are activated sludge, trickling filters, and intermittent sand filters. The activated sludge process consists of applying air to settled sewage for four to eight hours during which time much of the oxygen demand of the sewage is satisfied, and much of the colloidal and dissolved solids are changed to a form which will settle. The aerated sewage passes through a settling tank from which clear supernatant is discharged to a stream. The activated sludge which contains the biological flora responsible for oxidizing the sewage is removed from the settling tank bottom, and recycled to the aeration tank where it is mixed with more settled sewage, aerated, and resettled. The build-up of activated sludge takes about a month, after which some of the activated sludge has to be wasted. The trickling filter is essentially the same as the activated sludge process except, instead of building up a biological flora in floating sludge, it is built up on two- to four-inch stones, and the sewage is passed over it in thin sheets. A settling tank also follows the trickling filter but the sludge which settles is not recycled. The high rate trickling filter is a modern adaptation of the trickling filter whose distinctive characteristic is multiple passage of the settled sewage through the filter at a high rate with the resultant greater pollution reduction per volume of filter. The intermittent sand filter consists of a sand bed about three feet deep on which sewage is discharged. The sewage is purified to a pure, sparkling effluent as it percolates through the sand, and is acted on by the biological flora contained therein. No settling tank is required after this filter. The activated sludge process and the trickling filter are used generally for sewage treatment while the sand filter is used only for small installations because of the great area it requires.

Sludge (concentrated sewage solids) is produced in both primary and secondary treatment and is disposed of in several ways. The sludge may be partially dewatered on rotary vacuum filters, incinerated or dried, and sold as fertilizer. It may be discharged to a digester, and stabilized by anaerobic bacteria in approximately 30 days, with the production of methane and carbon dioxide gas. The digested sludge may be vacuum filtered or air-dried on sand beds and used as a low-grade fertilizer, or just dumped on waste land. The value of sewage sludge as a fertilizer varies with the sludge and the method of processing. Primary sludge contains grease that makes it unsatisfactory for fertilizer. Activated sludge and digested sludge are both satisfactory with the activated sludge containing larger amounts of nitrogen. One of the valuable byproducts of digestion is sludge gas, which contains about 60 per cent methane and has a heat value of about 600 BTU per cubic foot. Sludge gas will supply all of the heat required and part of the power required, for operation of the sewage treatment plant. The use of gas for heat and power, and the sale of sludge as fertilizer will reduce the cost of sludge disposal and, under favorable circumstances, will contribute something toward the operation of the rest of the plant, but it cannot be expected to turn the sewage treatment plant into a money-making venture.

Many other sewage treatment processes have been proposed or used. Those described are typical, and serve to illustrate the principles involved. Two additional processes will be described because of their historical importance. They are the septic tank and the Imhoff tank. Both tanks combine settling and sludge digestion and are used for primary treatment. The septic tank is older and combines settling and digestion in a one-compartment tank. As the sludge digests, the gas rises through and interferes with settling of solids in the sewage, with the result that the septic tank sometimes accomplishes very little in the treating of the sewage. The septic tank is cleaned from time to time by the removal of sludge from its bottom. It has been relegated to primary treatment for single-family houses, and for small numbers of people, usually less than one hundred.

The Imhoff tank has two compartments and separate settling and digestion, with the result that excellent removal of solids from the sewage

is accomplished. The compartments are arranged, one above the other, so that sludge settling from the sewage automatically falls into the digestion compartment. Sludge is removed from the digestion compartment from time to time as digestion is completed. Imhoff tanks have been, and will be, in wide use in small and medium sized cities where this type of treatment is more economical than the separate sedimentation and sludge digestion previously described.

Bacteria present one of the greatest dangers caused by sewage pollution of streams. Sewage treatment will reduce the numbers of coliform bacteria in the range of 80 to 99 per cent. This is not sufficient. The most effective method available for killing bacteria is *disinfection* with chlorine. Chlorine is usually brought into the sewage treatment plant as a liquid, and fed into the sewage as a water solution. It is most effective when applied to the sewage treatment plant effluent, but is often applied to other places in the treatment process to effect odor control as well.

Sewage treatment is much more complicated than this brief presentation can indicate and requires a man of considerable ability and enthusiasm to operate the simplest municipal sewage treatment plant. A large sewage treatment plant may be likened to an industrial plant with a technically qualified administrator, many technical specialists, and alert workers.

Industrial Waste Treatment.—Industrial wastes are here prepared for disposal. The processes used for treating sanitary sewage may be used for some industrial wastes. In fact, many industrial wastes are discharged into public sewer systems and treated in municipal sewage treatment plants. If the ratio of sanitary sewage to industrial wastes is great, then little difficulty is experienced. All industrial wastes cannot be treated by conventional sewage treatment processes, and some cannot be treated by any process now known. Industrial wastes are as varied as the industries producing them. Some industrial wastes are not merely waste materials, but often contain small amounts of the material the industry is producing. This opens the field of industrial waste treatment to partial solution by improved industrial processes and byproduct recovery. There is no single process which can be applied to the solution of industrial waste treatment problems, but there is a general procedure to be followed in attacking the problem.

The first step in the solution of any industrial waste problem is to adjust the industrial process to reduce the strength and volume of the wastes produced. This step was promoted very effectively by the State of Wisconsin in its program to reduce the pollution of its streams. Waste surveys showed that paper mill wastes contained tons of fiber worth many dollars. Screens were installed, much of the fiber was saved, and stream pollution was reduced. In other industries, process water can be re-used with a reduction in the volume of wastes. When process adjustments and changes have accomplished their maximum good, wastes should be examined for byproduct recovery. Byproduct recovery in the brewing and distilling industries has resulted in a profit from the sale of cattle feed produced. Byproduct recovery may be less expensive than waste treatment, and should be used as long as the byproduct recovery net cost is less than the cost of waste treatment. Most byproduct recovery processes produce wastes which are less objectionable than the original waste, but which will have to be treated prior to disposal.

When the two above lines of investigation have been exhausted, there remains the task of determining the most effective, least expensive treatment. The strengths, chemical characteristics, and volumes of each of the wastes produced in the plant must be determined. The wastes must be studied individually and collectively to determine whether they should be treated separately or be combined in some way prior to, or during, treatment. Chemical precipitation and settling of industrial waste is a common first treatment. A biological treatment is often required to obtain a higher degree of purification. The trickling filter, especially the high rate modification, is commonly used for biological treatment of industrial wastes, since it withstands, and recovers from, the great variations in volume and strength characteristic of many industrial wastes. Some wastes contain toxic materials which make biological treatment difficult. Ingenuity and imagination pay great dividends in the solution of industral waste problems.

A special problem is created by wastes from seasonal industries such as canneries and beet sugar plants. It is economically difficult to provide equipment and tanks to treat properly the large volumes of strong wastes which may be produced for a few months of the year. Many of these industries remove suspended solids from their wastes by screening or settling, and store the settled wastes in large artificial ponds called lagoons. Purification is accomplished biologically at a slow rate. Nitrates are added to the lagooned wastes to prevent odor production. The wastes are held in the lagoon until natural purification has reduced the strength to a point where they can be safely discharged to the receiving stream, often during high spring flows.

Many industries have sponsored study of their wastes to determine economical methods for waste treatment. Processes have been developed for the treatment of wastes which were essentially untreatable a few years ago. This action by industry is encouraging since it reflects industry's acceptance of industrial-waste, pollution-abatement responsibility. We may expect, however, that considerable time will pass before economical waste treatment processes are developed for all industries, and industrial waste stream pollution is reduced to permissible amounts. New industrial processes produce new wastes, often temporarily untreatable. We may look forward to the time when an industrial process is not considered complete or usable until methods for the treatment of wastes are perfected.

Refuse Collection and Disposal.—Refuse is composed of garbage, rubbish, and ashes. Garbage is composed of table scraps, materials produced during the preparation, cooking and serving of food, and similar wastes from other sources. Rubbish is combustible material such as paper, wood, grass, shrub trimmings, and, sometimes, includes incombustible material such as metal and tin cans. Ashes are the residue from the burning of solid fuel. The exact classification of garbage, rubbish, and ashes depends on local definitions writtten to aid the collection and disposal of the refuse. The sanitary engineer is interested in refuse because garbage is an excellent breeding place for flies, and may also serve as a source of disease bacteria which flies and rodents can carry to susceptible persons. He is

interested in the other components of refuse because garbage is often mixed with them, and because all refuse often is collected and disposed of by the same organization.

Garbage should be stored and transported in watertight and fly-tight containers. Garbage should be collected at least twice a week during warm weather and, at least once a week, during cold weather. Garbage may be collected by municipal collecting crews and equipment, by contractors paid and supervised by the city, or by scavengers paid by the home owners. Collection by unsupervised scavengers often creates unsanitary conditions because these persons lack knowledge of, or disregard, sanitation principles. Refuse containing significant amounts of garbage must be treated as garbage.

Rubbish should be stored in containers which will prevent scattering by the wind. Rubbish usually is collected once a week. The collection trucks should have a great volumetric capacity in order to collect a reasonable weight of this bulky material, and should be covered to prevent scattering by wind or motion of the truck. Trucks with watertight metal bodies, and provided with loading and load-packing devices, so arranged that the load is never uncovered, are available and are recommended.

Ashes are collected weekly in some communities; once a year in others. Ashes should be stored and handled to minimize dust nuisances.

The methods used for the disposal of refuse are incineration, sanitary fill, hog farms, reduction, land dumps, dumping at sea, and disposal at sea. All methods can be applied to garbage, but only some can be applied to rubbish and ashes.

Incineration consists of drying and burning the refuse in specially constructed furnaces called incinerators. Refuse is prepared for incineration by separating the garbage and refuse from the noncombustible materials. This separation is accomplished at the source. Garbage and rubbish, alone or in any combination, may be incinerated. The incinerator should incinerate or store the refuse as fast as it arrives. Collection trucks bring the refuse to the incinerator and dump it into a storage bin, from which it is fed to the incinerator at a rate giving efficient incinerator operation. Salvageable materials, or materials which may damage the incinerator are often removed prior to incineration. Much of the odor produced by some incinerators is associated with careless storage and handling of the refuse prior to incineration. Gases leaving the incinerator are heated to approximately 1,200°F. to destroy all odors. Incinerators can be operated with little smoke, but in critical areas, equipment may have to be installed to reduce the fly ash content of the stack gases.

The sanitary fill is an approved method of disposal for refuse. A sanitary fill is started by digging a trench approximately eight feet deep, fifteen feet wide, and as long as convenience dictates. Refuse is hauled to the fill, dumped into the trench, and compacted. When the refuse has built up to within three feet of the final grade, the top and faces of the refuse are covered with material excavated from a trench parallel to and just beyond the original trench. Dumping is restricted to a length of trench which will be filled in one day. The process of filling and covering is carried down the length of the trench, until the original trench is completely filled at which time there is another trench just beyond the original trench waiting to be filled. A dragline is required to dig the trench, and to compact and cover the refuse. A bulldozer is used to level the top of the fill for truck traffic, and to assist in compacting the refuse. The sanitary fill creates only one nuisance, the scattering of papers at the time of dumping. This nuisance is controlled by erection of fences to collect these papers, and by constructing movable windbreaks to protect the dumping trucks from the wind. The cost of sanitary fill disposal is less than incineration, if suitable land is conveniently located to make the collection haul short. Such land is quickly used in large cities. Several cities, which have abandoned incineration for sanitary fill disposal as an economy measure, have used up the conveniently located areas and are now faced with the use of incinerators to replace the sanitary fill which has become more expensive. In other words, as the nearby sites for sanitary fill are depleted, the extra cost of hauling to more remote sites is more than the savings in disposal costs. Land made by sanitary fills is useful as parks but should not be used for building sites. Explosive methane gas is produced by digestion of the refuse in the fill. The rate of evolution of the gas is so slow that no hazard is created unless buildings placed on the fill accumulate the gas. Several buildings placed on fills have suffered from explosions.

Hog feeding is often used for the disposal of garbage. The production of meat from garbage is a conservation practice which is popular and which may reduce the cost of garbage disposal, but which can be a health hazard if not properly supervised. The garbage must be carefully separated at the source to remove glass and other materials harmful to hogs. The garbage is hauled to receiving stations in the collecting trucks, and is transferred to larger trucks or trains for transportation to the hog farm. The long haul to an isolated farm may make the collection costs excessive. The garbage is placed on concrete platforms, and the hogs allowed to pick it over for several hours. The garbage residue, together with hog manure, is removed, spread on land, and plowed under as a humus. This requires large areas which are often used in rotation to grow grass and grains for supplementing the garbage diet of the hogs. Garbage-fed hogs should be fed grain for a few weeks prior to slaughter to produce a more acceptable meat. Hogs are susceptible to disease, must be immunized against hog cholera, and should be supervised by a veterinarian. Hogs fed on garbage are more likely to be infected with trichinae worms which cause trichinosis in humans. Garbage-fed hogs should be carefully inspected at the slaughterhouse to prevent sale of infected meat. Trichinae worms can be minimized by sterilizing the garbage prior to feeding. In fact, the United States Public Health Service prohibits the transportation of raw garbage across state lines if the garbage is to be used for feeding hogs. Sterilizing the garbage is expensive, is reported to make the garbage less palatable to hogs, and is accepted by few hog feeders. The odors characteristic of hog farming can be reduced by good housekeeping but cannot be eliminated. Fly breeding is also very difficult to control. This discussion of hog feeding is based on large farms using the garbage of a city, and is applicable only in part to hog farms feeding a few hogs.

Land dumping may be the most common ref-

use disposal method. It consists of dumping the refuse on the ground. For convenience, the dump is usually started at the top of a slope. Some dumps are intended only for rubbish and ashes. Practically all dumps, regardless of intent, contain liberal amounts of garbage. Decomposition of the refuse and dump fires create overpowering odors. Dumps support large numbers of rats, and keep the surrounding area infested. Dumps also produce swarms of flies which invade neighboring areas and carry filth from the dump to the dinner tables in nearby homes. Land dumping is probably the cheapest, most unsanitary, and greatest nuisance producer of all disposal methods. It is recommended only for the disposal of ashes and other noncombustible material which is free of rubbish and garbage.

Dumping at sea has been used by some seacoast cities with indifferent success. There is a tendency for some of the garbage to float to shore and beaches unless it is hauled a long distance to sea. This may be more expensive than some other disposal method.

Disposal of garbage with sewage is relatively new. Some cities collect the garbage and haul it to central grinding stations where it is ground and discharged into the sewer for water transportation to the sewage treatment plant. Other cities haul it to the sewage treatment plant, grind it and introduce it into the sewage treatment process. Householders may install garbage grinders under the sink as part of the plumbing. Garbage is accumulated in the grinder by pushing it down the sink drain, and is ground and flushed down the sewer as required. The home garbage grinder and sewer is the most sanitary garbage collection system known. Experience with this method of disposal indicates an increase in sewage flow of 10 per cent but no harmful effects on the sewer. The home garbage grinder also increases the organic load applied to the sewer treatment plant, and, if used widely, will require expansion of the secondary treatment and sludge handling facilities. The only problem here is a quantity problem which can be solved merely by expansion.

Space is not available to cover many of the other phases of sanitary engineering. However, many of these phases, such as milk production, rat control, and insect control, are covered elsewhere in these volumes.

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SANITARY TRAIN. See Ambulance Companies; Hospitals, Military; Medical Organization in the United States Army.

SANKARAN NAIR, sŭng'kà-rân nä'yĕr, Sir **Chettur,** Indian jurist and statesman: b. Malabar, India, July 11, 1857; d. April 24, 1934. He was educated at the Madras Presidency College and chose a career in law. He served as vakil (native public pleader) of the high court at Madras, and in 1899 became government pleader and public prosecutor to the government of Madras. During this period he interested himself in social reform, coming to advocate a gradual development under British leadership. He presided over the 1897 session of the Indian National Congress and at a number of congresses and exhibits which sought to improve social conditions and to promote Indian industry. He was the founder of the *Madras Review* and *Madras Law Journal.* For many years he was a member of the Madras Legislative Council, in 1907 he became Madras advocate general, and in 1908 a puisne (associate) judge of the high court there. From 1915 to 1919 he was secretary of education in the governor general's council, being one of the first Indians to hold a portfolio in that body. He was knighted in 1912. Sankaran Nair remained politically independent, and he supported the plan advocated in the Montagu-Chelmsford report (April 22, 1918) which proposed that participation in the government be gradually extended to Indians in successive stages, with a view to the definitive inclusion of India in the British Empire. This brought about his appointment to the Indian council (1920–1921) in England and completed the rift between him and the advocates of noncooperation, among whom was Mohandas Gandhi. Sankaran Nair's book *Gandhi and Anarchy* (1922) was a strong attack on his adversaries. He became a member of the Council of State of India in 1925.

SANKEY, Ira David, American evangelist: b. Edinburg, Pa., Aug. 28, 1840; d. Brooklyn, N. Y., Aug. 13, 1908. His introduction to music took place at an early age, his family being musically inclined. After leaving high school, he was engaged as a clerk in a bank at Newcastle, Pa., of which his father became president in 1857 and, after serving with the Union Army in the Civil War, he again took a position with his father, now a collector of internal revenue. Meanwhile, however, Sankey had sung in the choir of the Methodist Church at Newcastle and had been chosen its choir leader and superintendent of its Sunday school. He was also active in the Young Men's Christian Association, and was made a delegate to its convention at Indianapolis in 1870. It was here that he met Dwight L. Moody (q.v.), the evangelist with whom he was intimately associated until Moody's death in 1899. In 1873 they went to the British Isles to conduct evangelistic services. Sankey's contribution was his singing. Although his voice was not a great one, the simplicity and expressiveness of his singing moved audiences profoundly. What began as a modest and unheralded effort, ended as a triumphant religious awakening, and when the evangelists returned to the United States in 1875 the foundations for many successful campaigns had been laid. Royalties from their very popular hymn collections, *Sacred Songs and Solos* (1873) and *Gospel Hymns* (1875–1891) were surrendered, largely in the interest of the Northfield (Mass.) School. Sankey also wrote *My Life and the Story of the Gospel Hymns* (1906).

SANKHYA, sän'khya, the name of a philosophical system of ancient India. It is attributed to a writer by the name of Kapila, about whom we know absolutely nothing. While the extant texts do not date back much further than 1380 A.D. Sānkhya writings are known to have been translated into Chinese in the 6th century, and the inception of the school is probably considerably earlier. The philosophy is strictly a dualism, and indeed the name of the school may be translated as "pluralistic." The *Prakriti,* or matter of the universe, is opposed to the *Purushas,* or souls, of which there are an unlimited number. The *Prakriti* assumes eight

forms and 16 modifications. That deliverance from continual rebirth which constitutes the goal of all Indian philosophy is attained, according to the Sāṅkhya (Sāṃkhya) school, by a complete knowledge of the soul principle and of the 25 modifications of matter. This deliverance consists in the separation of the soul principle from its pain-giving material environment. The material world has a certain history determined by its very nature. It is tripartite, consisting of goodness, darkness and passion. These were primitively in an equilibrium which gradually becomes upset until a new equilibrium is formed and a new universe. Without the intervention of the soul (purusha) the matter or nature (prakriti) develops within itself a world intelligence. This generates consciousness, which by a gradual process of degradation gives rise to the cruder matter forming the object of our experience. Thus the entire psychical life, in so far as it may be analyzed and expressed in discourse, is derived from the matter constituent of the universe rather than from the soul constituent. The method in accordance with which the individual soul comes into contact with a particular part of the material universe is by no means clear. In whatever context it occurs, the soul is unmoved by emotion, without will, and entirely absorbed in a cognition which has no object. Notwithstanding its inactivity, it stimulates the material body consciousness complex into will, emotion, and the knowledge of definite objects. Since to the Indian mind the notion of consciousness is inseparable from that of pain, the union of soul and body in life is by its very nature painful, so that the purpose of philosophy is to interrupt the continual imprisonment of the soul in one body after another. As has been said, the Sāṅkhya philosophy maintains that when the distinction between the psychical and the material is clearly envisaged throughout the universe, this distinction becomes a real distinction as well as a conscious one, and the soul lapses into the unconsciousness of a trance. See also INDIA, SUBCONTINENT OF—*9. Religion and Philosophy* (Sāṃkhya); HINDUISM—*Systematic Period.*

SANNAZARO, sän-nä-dzä′rô, **Jacopo,** Italian poet and epigrammatist, descendant of a noble family of Spanish origin: b. Naples, Italy, July 28, 1458; d. there, April 27, 1530. After study under A. Pontano (Pontanus), he was admitted to the Arcadian Academy as Actius Sincerus, the name he selected to be known by, according to the prevailing custom. He spent several years in foreign travel and on his return to Naples soon became famous as a poet and courtier. His verse attracted the attention of King Ferdinand I of Naples and his sons Alfonso and Frederick. The last named when he ascended the throne as Frederick III in 1496 gave him the villa of Mergellina with a pension of 600 ducats. In 1501, when Frederick was forced into exile by Louis XII, Sannazaro accompanied him and remained with him until his death in 1504. During this period he completed his famous *Arcadia,* a pastoral poem published in 1504, which passed through 60 editions before the close of the 16th century, and was largely imitated. His subsequent works include *De partu Virginis* (1526), a Latin poem which earned him the title of the "Christian Virgil"; and his collected *Sonetti e canzoni* (1530). His elegance of expression, no less than the poetical beauty of his thoughts, give him a distinguished place among the Latin poets of the Renaissance.

SANSEVIERIA, săn-sĕ-vēr′ĭ-ȧ, is a genus of about 60 species of herbaceous perennials, commonly called bowstring hemp, found in tropical and South Africa and the East Indies, and belonging to the lily family (Liliaceae). The characteristic basal rosettes of sword-like leaves arise from creeping rootstalks. The leaves yield a strong, white, elastic fiber (bast fiber), mostly obtained from wild plants and widely used by natives for mats, hammocks, bowstrings, and other crude cordage. Bowstring hemp has been in cultivation in India for a very long time. The fiber is usually removed by hand or mechanical devices. The most important species are: *S. thyrsiflora,* of tropical Africa, cultivated in Jamaica and Central America; *S. Roxburghiana,* of India; and *S. zeylanica,* cultivated in Ceylon and other tropical countries. About ten species are cultivated in the United States, mostly as porch or house plants.

SANSKRIT LANGUAGE, săn′skrĭt, the oldest stage of the Indo-Aryan subfamily of Indo-European. Bands of Indo-European speakers seem to have emerged from the country north of the Caspian Sea into the Middle and Near East in the first half of the 2d millennium B.C. Some of them, after various vicissitudes, settled in Iran and their language developed into the Iranian languages called Old Persian, Avestan, Middle Persian, and later Pahlavi, Persian, and others. The other branch seems to have experienced various wanderings. From proper names and other material in their records some are known to have formed an element in the Mitannian and Kassite kingdoms of northern Syria and Mesopotamia (c.16th–14th centuries B.C.). Their much better known linguistic brethren went east toward India and invaded the Indus Valley probably in the first half of the 2d millennium B.C.; the chronology is very uncertain. Here these horse and cattle nomads seem to have met a people with a highly developed urban civilization (the Harappa culture), and apparently destroyed what they found but enslaved the people of the old culture.

The invaders were Indo-Aryan speakers, and the indigenes were possibly Dravidian speakers. The Indo-Aryans finally settled for a time in the Punjab (Upper Indus Valley) and here produced at least the earlier parts of the Vedic ritual literature. (See VEDIC LITERATURE.) They spoke a number of dialects, one of which is the nucleus of the old Vedic language. There are, however, traces of other dialects in this literature; for example, it is usually held that both *l* and *r* of Indo-European became *r* in the basic Vedic language, but that in another dialect of the time both *l* and *r* became *l,* and that some words with *l* were borrowed from this dialect into the basic Vedic language.

As time went on within the Vedic period, which probably is to be considered as ending about the middle of the 1st millennium B.C., there was expansion of the Indo-Aryan speakers eastward down the Ganges Valley. In time and in space new dialects evolved among all classes of the people. The language spoken in everyday life diverged more and more from the old language of the ritual, and even before the end of the Vedic period many speakers of Indo-Aryan were using

dialects which had features later found in Middle Indic (Prakrit). Some forms of this type were even used when new ritual literature was composed, and some of the latest ritual compositions were included even in the first of the compilations known as the Vedas, the Rig Veda (*Rgveda*). There was also borrowing into the Vedic language of words from the Dravidian languages of the aborigines, whether they were the people of the Harappa culture or were merely the inhabitants of the Ganges Valley whom the invaders met in their eastward expansion.

A concern for verbal accuracy in ritual utterances seems to have troubled the Vedic peoples very early. At some time in the Vedic period this concern led to the growth of a technique for preserving accuracy, namely grammar, in the sense of describing accurately the sounds and forms of the desirable utterances, and in the further sense of prescribing what was desirable and teaching what was to be avoided. A long series of Vedic grammarians (their works are the *Prātiśākhyas*) culminated, through stages whose details are far from certain, in Pāṇini (c.5th century B.C.). He, however, described in his famous grammar (the *Aṣṭādhyāyī*, "the eight-chaptered work") his own spoken language, which was not quite the same as the old Vedic and was also not yet the Middle Indic which some communities were already speaking. He was interested in some Vedic forms, but gave them only as divergences from the dialect which he spoke and which he was primarily interested in describing. His language was as much a true Old Indic as was Vedic, but it was a somewhat different dialect. We can localize him as having been born in Salatura in what is now the North-West Frontier Province of Pakistan, but this throws little light on the nature of the local dialects of his time.

From Pāṇini's time on, spoken dialects diverged more and more from the norm he had described, but with minor exceptions all who wrote with an eye to acceptance by the learned followed his description. They wrote, and even learned in their schools to speak, in a literary language which was less and less the language of everyday life. To this literary language they gave the name Sanskrit (*saṃskṛta*), the "polished" or "cultivated" or "refined" or "perfected" language, as opposed to the everyday languages, which they called Prakrit (*prākṛta*), the "natural" languages. The literary Sanskrit, as the heir of the Vedic religious tradition, became the vehicle of Hindu culture and has remained down to the most recent times the language in which the traditional Hinduism of India has found its expression through its learned custodians, the Brahmans. The situation is very like that of Latin, which was the vehicle of the classical and medieval culture of Europe and still lives today in the liturgical and other writings of the Roman Catholic Church.

The two dialects of Old Indic, Vedic and Sanskrit, are in structure very like Latin and classical Greek. They have complex inflectional systems for nouns, adjectives, pronouns, and verbs. Nouns, adjectives, and pronouns have the categories of number (singular, dual, plural); gender (masculine, feminine, neuter); and case (nominative, accusative, instrumental, dative, ablative, genitive, locative, vocative). The Vedic verb has categories of voice (active and middle); mood (indicative, subjunctive, optative, imperative); tense (present and imperfect, perfect, aorist, future); number and person. The present stems of verbs show a large number of different types (formed by various suffixes and infixes, and by reduplication). In addition to the simple verb, there are secondary verb types—passive, causative, desiderative, intensive—and some combinations of these (for example, a passive of the causative), which show forms in most of the categories of the simple verb. Like the Indo-European languages in general, this language has many combinations of verb forms with adverbial prefixes, with the meanings of the combinations very often not obtainable by a simple addition (compare English *understand*). The Sanskrit verb system differs from the Vedic in that it shows fewer of the categories (for example, the subjunctive is almost totally disused, the aorists are moribund), but since Pāṇini taught much of the Vedic verb system, there was a tendency for learned literary men to use many of the strictly Vedic forms in order to show their learning. As in Latin and Greek, stems, suffixes, and prefixes often have several different phonetic forms depending on the phonetic surroundings in which they are found; this applies also to words within sentences: for example *nalo vadati* (Nala is speaking), *nalaḥ pacati* (Nala is cooking), *nalas tiṣṭhati* (Nala is standing), with three forms of the nominative singular meaning "Nala." Again, as in Latin and Greek, sometimes a number of different categories are carried by one unanalyzable form: for example, in such a form as *asmi* (I am) the unanalyzable suffix *-mi* is first person, singular number, present tense, indicative mode, active voice; and the same category is often represented by very different forms in different word classes.

This highly complex morphology was described by Pāṇini with such detail and yet with such systematic lucidity as was not achieved for the classical languages Latin and Greek or for the modern languages of Europe until recent times. When Sanskrit became known to Europeans toward the end of the 18th century, it was learned in the traditional way, through the medium of Pāṇini's grammar. With this systematic aid it was seen by Sir William Jones, and announced in 1786 in a famous address which he delivered in Calcutta, that Sanskrit, Greek, and Latin "have sprung from some common source which, perhaps, no longer exists." He suspected that the Germanic and the Celtic languages probably had the same origin. This was the seed from which sprang Indo-European comparative grammar, the branch of linguistics which sets forth in all detail the relationship posited by Jones. His "perhaps" has turned out to be "certainly." At times his clear vision was neglected and it was suggested that Sanskrit was really the "common source" of the other languages. After this was firmly proved to be incorrect, it was for a long time held that Sanskrit was at least more archaic in its sounds than the other languages of the group. Even this has turned out to be only partly correct. The vowel system of Sanskrit is less archaic than that of classical Greek (for example, *a, e,* and *o* of Indo-European have all become *a* in Sanskrit, but have remained separate in Greek), and its consonant system shows a good deal of change through palatalization and other changes; on the other hand, the Vedic language has preserved more traces of the old Indo-European system of semivowals than has any other of the languages.

In spite of all the Sanskrit changes, the systematic relationships of the Indo-European vowels were partially preserved in Sanskrit (the ablaut system), and the Hindu grammarians' systematic description of the relationships put scholars on the right path toward a lucid understanding of the much richer system seen in Greek. Sanskrit is only one of the Indo-European languages and not the one with the oldest records (Hittite holds that position with at least one document datable in the 17th century B.C.). The material, however, that Sanskrit yields for Indo-European studies and its historical role in those studies still make it one of the primary languages in that branch of linguistic discipline. See also INDIA, SUBCONTINENT OF—*4. Languages,* and *5. Literature*; PRAKRIT LANGUAGES AND LITERATURE.

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SANSKRIT LITERATURE. This literature consists, to speak precisely, of works written in conformity to the vocabulary and grammatical usage advocated by the famous grammarian Pāṇini, who may have lived in the 4th century B.C. and whose perfecting (Sanskrit means "perfected") of the older or Vedic form of the Aryan language in India had become standard by the 2d century B.C. In contrast to Vedic literature (q.v.) Sanskrit writing, although characterized by much moralizing and philosophizing, is generally secular.

Because of redaction and late additions the ancient epics, the *Mahābhārata* (q.v.) and the *Rāmāyaṇa* (q.v.), have come down to us in Sanskrit dress. Somewhat resembling these in their heterogeneity and massive scope but without any straight line of narrative, we have in Sanskrit 18 famous *Purāṇas,* potpourris of legend and history, which treat of the creation of the universe, the genealogy of the gods and patriarchs, the reigns of the various Manus or lawgivers, and the history of the Solar and Lunar dynasties of Indian kings. Shorter if not more pointed narratives are the *Kāvyas* or artificial court epics, the most famous of which were written by Aśvaghoṣa, Kālidāsa, Bhāravi, Kumāradāsa, Māgha, and Rātnakara between the 1st and 11th centuries A.D. For the most part these art epics specialize not in storytelling but in elaborate descriptions of sunset and moonrise, mountain and forest scenery, love trysts, sacred bathing, and horrendous battles. They contain a tropical wealth of simile and metaphor set forth with unbelievable verbal acrobatics.

Other narrative writing in Sanskrit includes collections of beast fables (such as the *Pañchatantra* or *Book of Five Chapters*) in which animals play human roles and the prose is interspersed with excellent gnomic poetry in such a way as to make good behavior attractive to young princes. A talking bird dominates the *Suka Saptati* or *Seventy Tales Told by a Parrot* while a kind of zombie dispenses wisdom in the *Twenty-five Tales of a Vetāla.* Nearly all of the great Sanskrit story collections were gathered into a versified supercollection as the *Kathāsaritsāgara* or *Ocean of the Streams of Story* by Somadeva in the 11th century. Prose romances in the ornate *kāvya* style include the 6th century *Vāsavadattā* of Subandhu, Daṇḍin's 7th century *Ten Princes* and Bāṇa's *Kādambarī.*

Important lyric poetry in Sanskrit was written by Kālidāsa, Bhartrihari (7th century), Amarū (9th century), and Bilhaṇa (11th century), often in *śatakas* (collections of a hundred stanzas each) about love, though two 7th century poets, Mayūra and Bāṇa, are famous for *śatakas* about, respectively, the sun god Sūrya and the goddess Caṇḍī (Durgā). "The last great name in Sanskrit poetry" is that of Jayadeva (12th century), whose *Gitāgovinda* or *Song of the Divine Cowherd* (Krishna) is a lyric drama or opera.

It was in drama that Sanskrit literature achieved its highest perfection. Here the name of Kālidāsa stands unrivaled, followed by those of Bhavabhūti (8th century), Harṣa (7th century), Śūdraka (5th century), and Bhāsa (3d century). See also INDIA, SUBCONTINENT OF—*5. Literature.*

RODERICK MARSHALL.

SANSOVINO, sän-sō-vē'nō, **Andrea,** Italian sculptor: b. Monte San Savino, Tuscany, Italy, 1460 (whence he was familiarly known as Sansovino, his real name being CONTUCCI); d. Rome, 1529. He was a pupil of Antonio Pollaiuolo, and early formed his style on that of Leonardo da Vinci. It was under their influence that he produced such reliefs as the *Coronation of the Virgin; The Annunciation,* and the *Pietà.* In 1491 he was summoned by the king of Portugal to Lisbon, where for nine years he exercised his art as sculptor and architect. Returning to Florence in 1500 he carved the group of *Christ's Baptism* over the east portal of the Baptistery, which exhibited a nobility of form and expression unparalleled at that period, although he never completed the group. A statue of the Madonna and one of John Baptist for the cathedral at Genoa were his next works, and afterward he accepted a commission from Pope Julius III to execute the tombs of Cardinals Basso and Sporza for the choir of Santa Maria del Popolo. In these sepulchral monuments we see that the high-water mark of the 15th century art is reached; they are the most masterly sculptures of their kind that Rome possesses. In 1512 he completed his *Saint Anne with Two Other Saints* in the church of San Agostino in Rome. He was then entrusted by Pope Leo X with the decorations of the church at Loreto (1513–1529). Among the reliefs there the *Annunciation,* the *Nativity,* and the statue of *Jeremiah* are his own works; the rest of the decorations were produced under his direction by various artists. Nothing can be finer than the blending of classic severity with the freshness of Renaissance life in these figures which exhibit the results of a pure study of nature. Expression and action are full of deep feeling, yet not so emphasized as to overstep the line of modesty.

SANSOVINO, Jacopo (real name JACOPO TATTI), Italian sculptor and architect: b. Florence, Italy, 1479; d. Venice, Nov. 27, 1570. He took his name from the great artist who had been his teacher, and began his career in Florence where his first works of note were his statue of *Jacob* in the Santa Maria del Fiore cathedral and his marble *Bacchus* in the Bargello. Belonging also to this early period is a *Madonna*

and Child in the Church of San Agostino at Rome. In 1527 he went to Venice where his genius being quickly recognized he was appointed architect to the republic. His untiring labors from that time to his death have left his stamp both on the sculptural and architectural monuments of Venice. He is a brilliant example of the Italian artists in the noonday splendor of the Renaissance and in his architectural creations unites play of fancy and elegance of proportion with the most impressive and monumental dignity.

His preeminence as a sculptor is not so evident; his plastic work is often unpleasing and evidences a failure to master either the principles or the materials of his art, so that his work appears mannered and mechanical. His greatest successes in architecture are the *Corner Palace* (1532); the library of Saint Mark's, a splendid example of Italian Renaissance (1536); the Mint; and the churches of San Martin, San Giorgio dei Greci and San Giuliano. The *Burial of Christ* and the *Resurrection,* are fine reliefs on the bronze doors of the sacristy of Saint Mark's, and among other plastic works of his are a sitting figure of *St. John* in Santa Maria dei Frari; the statues of *Hope* and *Love* on the tomb of the Doge Venier in San Salvatore; and the gigantic figures of *Mars* and *Neptune* in the Doge's palace.

SANTA ANA, săn'tà ăn'à, city, California, and Orange County seat, alt. 133 feet; on the Atchison, Topeka and Santa Fe Railroad, the Southern Pacific Railroad, and the Pacific Electric Railway; by rail, 34 miles southeast of Los Angeles; has an airport. It is the trading center of the Santa Ana Valley. Packing and canning, and beet-sugar refining, are its leading industries. Great quantities of chili peppers, pimentos and walnuts are shipped from here. The principal manufactures are woolen goods, glassware, and agricultural implements and machines. In addition to the public school system, with two junior high schools and one senior high, there are parochial and trade schools, and Santa Ana Junior College. The city has several hospitals, a public library, and a museum with collections of relics of the early days of California. Santa Ana was founded in 1869. Pop. (1940) 31,921; (1950) 45,533.

SANTA ANA, city, El Salvador, capital of the Department of Santa Ana, departmental capital, on International Highway, 32 miles northwest of San Salvador and the Pacific port of Acajutla. It is a well-built city, the second in size of the republic, and lies about 2,100 feet above sea-level, in a mountain-encircled valley, abounding in coffee and sugar plantations, and forests. The Doric church, municipal building, hospital and military barracks are the principal buildings. There are numerous manufactures of domestic commodities and an active export trade in coffee and sugar, which increased considerably after the railway reached the city in 1900. Pop. (1950) 51,676. In the vicinity is Santa Ana (Izalco) 6,700 feet high, the loftiest volcano in the republic.

SANTA ANA INDIANS, a Pueblo tribe of New Mexico. See KERESAN.

SANTA ANNA, or **SANTA ANA,** săn-tä ä'nä, **Antonio López de,** Mexican general and politician: b. Jalapa, Feb. 21, 1795(?); d. Mexico City, June 20, 1876. He entered the army at 15, and attained public prominence as a supporter of Iturbide in 1821. The following year, after having expelled the royalists from Vera Cruz, he took command in that city, where he led a revolt (Dec. 2, 1822), which hastened the retirement of Augustín de Iturbide, who had made himself emperor. After the defeat of the Federal Party in 1822 Santa Ana retired to his estate; but he emerged again in 1828 in support of Vincente Guerrero's claims to the presidency, in which the latter supplanted Anastasio Pedraza. In 1829 the Spanish invasion furnished Santa Anna a favorable opportunity, and as minister of war and commander in chief at the head of the Federal forces he compelled Barradas to capitulate at Tampico, September 11. He soon joined with Anastasio Bustamante in overthrowing Guerrero, and setting up the former in his place, but also, in 1832, led in the overthrow of Bustamante himself, and the restoratoin of Pedraza. In 1833 Santa Anna was chosen president, and soon after renounced the party of the Federalists and put himself at the head of the Centralists, who desired the centralization of power in the executive government. His popularity with the army was not shared in by the nation at large, which feared that he was aiming at imperial power. On May 11, 1835 he defeated an insurgent army on the plains of Guadalupe, and as the blow was fatal to the Republicans he was shortly afterward named dictator. The federal constitution was abolished and the governors of the several states became dependent upon the central power.

Texas, however, having long nourished a revolutionary feeling, now broke out into rebellion. Santa Anna attacked San Antonio in February 1836, stormed the Alamo (q.v.), and massacred its defenders, March 6, and going forward pursued the Texans under Sam Houston (q.v.), by whom, however, April 21, at the Battle of San Jacinto (q.v.) his forces were routed and himself taken prisoner. He secured his release by a treaty recognizing the independence of Texas, which, however, was repudiated by Mexico, that country also suspending his dictatorship.

He was permitted to go to the United States, and after his return to Mexico in 1837 lived in retirement for a year, but offered his services to his country against the French in 1838, and taking command of the troops, repelled the assault on Vera Cruz (December 5) and forced the enemy to retire. In this engagement he lost a leg, a casualty which, however, contributed to restore him to popular favor. He again became a leader of the Centralists, and from October 1841 to June 1844 was virtual dictator under the title of President. The new constitution of June 12, 1843, under which he was formally elected President, increased his dictatorial powers, the exercise of which led to a fresh revolution, resulting in his overthrow. He was taken prisoner in January 1845 and banished. But on the eve of the war with the United States, he was recalled (July 1846), and was first appointed generalissimo by the provisional government and in December was made provisional president. At the opening of 1847 he led an army of 20,000 against the American troops under General Taylor, and fought the battle of Buena Vista, February 22-23, in which he was defeated. On April 18 he was attacked and defeated at Cerro Gordo by General Scott. Immediately after the Battle of Chapultepec the City of Mexico fell and was entered by the Americans (September 14). Santa Anna, escaping

from the city, briefly continued a desultory warfare; but on April 5, 1848, having resigned the presidency, he received permission to retire from the country and sailed for Jamaica, going thence to Venezuela. In 1853 he was recalled and elected President for one year, but after setting up an odious despotism, he proclaimed himself (December 1853) President for life, with the title of Serene Highness and the right of nominating his successor. Revolution followed in March 1854, and when he saw that his cause was lost Santa Anna fled from the capital (Aug. 9, 1855) and found refuge in Cuba, Venezuela, and Saint Thomas. In this absence he was tried and condemned for treason, and his estates were confiscated. He returned to Mexico during the French occupation (1864), but was not permitted to remain. In 1867 he again returned, but was once more exiled and went to live in the United States. Finally, after the death of Juarez and the amnesty of 1874, he was permitted to reside in his own country, where his career ended in poverty and obscurity. See also MEXICAN WAR; MEXICO—*History* (Independent Mexico); TEXAS —*History*.

SANTA BARBARA, săn'tà bär'bà-rà, city, California, and Santa Barbara County seat, altitude 27 feet, located on Santa Barbara Channel, an arm of the Pacific Ocean, protected by the Santa Barbara Channel Islands, 103 miles northwest of Los Angeles. It is served by the Southern Pacific Railroad, by two airlines, and has a fine yacht harbor.

A seaside city and year-round resort, with a rich California agricultural hinterland, it is the trading center for a district comprising parts of three counties. There is light industry in the city, and there are extensive oilfields nearby. The industry existing is of the lighter handcraft variety and chiefly local.

Educational and cultural interests are strongly represented. Elementary schools are about evenly divided between public and parochial. In the former group are two junior high schools, and one senior high, with excellent private schools available. Besides these there are St. Anthony's Academy and a branch of the University of California—Santa Barbara College. The college has a fine library with the William Wyles collection of books and documents relating to Lincoln, the Civil War, and the Reconstruction period. The Faulkner Art Gallery, Museum of Art, Museum of Natural History, the County Bowl—a natural amphitheater used in the annual "Old Spanish Days" Festival and other municipal gatherings—all combine with the Courthouse and many old buildings in linking the city's American present with it colonial Spanish past.

History.—The city's heritage is commemorated in many community celebrations. Santa Barbara Mission is one of the finest examples of mission architecture and historical significance. It was founded in 1786 by the immediate successor to Father Junípero Serra, with the present building dating from 1815. The first white man to visit the city's site was the Spanish navigator Juan Rodríguez Cabrillo in 1542. In 1782, the viceroy of Mexico sent a group of men here to found a presidio or fortified settlement. Yankee trade developed as the years progressed until, in 1846, Commodore Robert Field Stockton claimed the land and flew the American Flag over it. The garrison he left was driven out, but Col. John C. Frémont, United States Army, retook the post and shortly afterward the United States acquired California. In 1887 the railroad reached the city from the south, and in 1901, Santa Barbara was connected by rail with San Francisco, and the modern era began.

Santa Barbara is named in honor of St. Barbara as the Mission was founded on her day, December 4. The settlement was incorporated as a city in 1850. The city's government is of the mayor and council plan. Pop. (1940) 34,958; (1950) 44,193.

SANTA BARBARA, city, Honduras, in the Department of Santa Barbara near the river Ulúa, 45 miles south-southwest of San Pedro Sula. It is a commercial center of an agricultural area raising livestock and growing sugarcane. Its main industry is the manufacture of palm hats. It was founded in 1761 by settlers from Gracias. Pop. (1950) 2,684.

SANTA BARBARA, municipality, Philippines, Province of Iloilo, island of Panay, be-

Santa Barbara Mission.

tween a branch of the Janipaan River on the north and the Tigón River on the south, 12 miles north of Iloilo, the provincial capital. Pop. (1948) 35,406.

There is also a smaller municipality of the same name, Province of Pangasinan, Luzon, 12 miles east of Lingayén; at the crossing of two roads. Pop. (1948) 15,125.

SANTA BARBARA CHANNEL, strait, in the Pacific Ocean, between the northern islands of the Santa Barbara group and the mainland of California.

SANTA BARBARA ISLANDS, a group off the coast of California, lying 20 to 60 miles from the mainland, south and southeast of Santa Barbara city. They are nine in number; San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, Santa Catalina, San Clemente, San Nicolas, and San Juan. From San Miguel on the north to San Clemente is about 155 miles.

SANTA CATALINA, săn'tă kat"l-ē-nă, or **CATALINA,** island, California, one of the Santa Barbara Islands, separated from the mainland by San Pedro Channel and Gulf of Santa Catalina. The island was discovered in 1542 by Juan Rodríguez Cabrillo, a Portuguese explorer in the service of Spain, and was named by him San Salvador. The explorer Sebastian Vizcaino visited the island 60 years later and gave it the present name, in honor of St. Catherine of Sienna. The island is 22 miles long, with an average width of four miles; area, about 55,000 acres. It is hilly and well-wooded and has many deep gorges. Avalon is the only town on the island. The surrounding waters abound with fish. The island is privately owned.

SANTA CATARINA, săn'tă kăt-ă-rē'nă, state, Brazil, bounded on the north by the state of Paraná, on the east by the Atlantic, on the south by the state of Rio Grande do Sul, and on the west by the Argentine territory of Misiones; it includes the fortified island of the same name, and several smaller ones on the coast; area, 28,620 square miles. Florianopolis (pop., 1950, 49,290), is the capital. A series of valleys run west to east, formed by spurs of the boundary mountain range, and the state is watered by the river São Francisco, and numerous streams all falling into the Atlantic. The headwaters of the Uruguay River are in this state. The soil, though in the lower lands sometimes sandy, is fertile, the climate mild, and the seasons regular. Sugar, rice, mandioca, millet, beans, onions of immense size, and garlic are the chief cultivated products, considerable quantities of which are exported to Rio de Janeiro. The indigo and cochineal plants grow luxuriantly, and wheat and flax give good returns.

The state is well wooded, producing excellent timber; and gold, silver, iron, coal, and petroleum exist. The forests are infested by ounces, coatis, monkeys, pigs, and other animals. Birds are numerous, including several varieties of hummingbirds, and the lakes and rivers are frequented by innumerable geese and other waterfowl. Pop. (1950) 1,578,159.

SANTA CLARA, săn'tă klâr'ă, city, California, in Santa Clara County, altitude 83 feet, 45 miles south of San Francisco. It is served by the Southern Pacific Railroad, Southwest Airlines, and bus lines.

The center of a rich agricultural area, it has numerous huge fresh and dried fruit processing industries as well as frozen fruit and vegetable plants. There are also several mills including one of the largest sash and door companies on the coast. Other industries are insulation material, paint, and paper.

Santa Clara was first settled by Fransicans in 1777; it became a town in 1852; and received a new charter in 1867. The old Santa Clara Mission is of great historic interest. A fine boulevard, the Alameda, connects the town with San Jose. Municipal government is administered by a board of five trustees. Pop. (1940) 6,650; (1950) 11,702.

SANTA CLARA, city, Cuba, capital of the Province of Las Villas, on the United Railways, 160 miles east-southeast of Havana. It was founded in 1689. Formerly it was the eastern terminus of the railroad from Havana, but in 1902 the railroad system was extended to the eastern end of the island. It is the center of a fertile agricultural region, is the second largest inland city of Cuba, and has considerable commercial importance, which is increasing with the development of the railroad facilities. Silver has been mined in the vicinity, but not successfully; an excellent quality of asphalt and graphite are obtained and exported; and illuminating gas for lighting the city has been manufactured from this asphalt; petroleum is also reported in the vicinity. The city is well built, the streets are wider than is usual in the older Cuban cities, and municipal sanitation has been improved since 1898. Pop. (1943) 53,981.

SANTA CLARA, University of, an institution for higher learning established at Santa Clara, Calif., on the site of the old Santa Clara Mission in 1851. It was incorporated as a university in 1875, but was known as a college until 1912 when the title university was assumed. Its courses comprise philosophy and letters; general science; civil, mechanical and electrical engineering; architecture; pedagogy; and a premedical course. It is Roman Catholic in denomination. The average enrollment is about 1,200 students.

SANTA CLAUS, săn'tă klôz, corruption of St. Nicholas, the patron saint of children. Under this name he is especially associated with the giving of presents at the Christmas season. See also NICHOLAS, SAINT.

SANTA CRUZ, săn'tă krōōs', 1ST MARQUIS OF (ALVARO DE BAZAN), Spanish admiral: b. Granada, Dec. 12, 1526; d. Lisbon, Feb. 9, 1588. Under Don John of Austria he played a brilliant role at Lepanto (1572) and the next year at the taking of Tunis. His victory off Terceira (1583) completed the Spanish conquest of Portugal. That year he proposed to Philip II the conquest of England. His plan was accepted and he was commissioned to organize and command the requisite fleet. Unjustly reproached by the king for long delays in its preparation, he died at Lisbon a few months before the "Invincible Armada" at length sailed from that port under command of the incompetent duke of Medina Sidonia.

SANTA CRUZ, săn'tă krōōs, **Andrés,** Bo-

livian soldier and politician: b. La Paz, Bolivia, about 1794; d. St. Nazaire, France, 1865. He was of partial Indian descent, entered the Spanish army and rose to the rank of colonel. He was captured by the patriots in 1820, persuaded to adopt their cause, became a general in the army, and led an invasion of Upper Peru in 1823. In 1826–1827 he was acting President of Peru under Bolivar and in 1829 he was elected President of Bolivia for a term of 10 years, receiving also the title of grand marshal. His measures were progressive and the country enjoyed great prosperity under his administration. From the first he adhered to his purpose of uniting the Pacific Coast republics, and his successful invasion of Peru in 1836 was followed by his proclamation of the Peruvian-Bolivian confederation. In 1839 a Chilean army invaded Bolivia and defeated Santa Cruz at Yungay. He resigned and left the country, whereupon the confederation was dissolved. He was afterward engaged in Europe on various diplomatic missions for Bolivia.

SANTA CRUZ, săn'tä krōōz'; Spanish sän'tä krōōs', national territory, Argentina, in southern Patagonia, area 77,843 square miles. It is the southernmost area of continental Argentina between the Deseado River and the Strait of Magellan and bounded by the Andes and the Atlantic Ocean. It is predominately a sheep raising area; some alfalfa, potatoes, and grain are grown. The capital is Río Gallegos.

In 1946 the Comodoro Rivadavia military zone was established by the Argentine government which took part of the territory's northern area. Pop. (1947) 24,582.

SANTA CRUZ, department, Bolivia, bounded on the north by the Department of Beni, and the Brazilian Province of Mato Grosso; on the east by the river Paraguay and the Brazilian territory; on the south by the desert of Gran Chaco (Chaco) and Chuquisaca Department; on the west by the Department of Cochabamba; area 142,105 square miles. It is mostly level, except in the western part where it reaches the Andes. It is drained by the Rio Mamoré and the Rio Beni, and their tributaries. The central region is heavily wooded, with some open marshes and plains. It is thinly populated, most of the towns being in the western part and along the rivers. The soil between the mountains and the central forests is fertile, and yields sugar, coffee, cacao, and rice. Some cotton is manufactured and gold is mined in the mountain district. Pop. (1949 est.) 409,800.

SANTA CRUZ, city, Bolivia, capital of the Department of Santa Cruz, on the Piray River, on the eastern slopes of the Andes. It is in a fertile agricultural region producing sugar, coffee, and petroleum.

It is an important trade center for the agricultural products produced in the area (sugarcane, rice, coffee, and tobacco). The city was founded in 1560. Pop. (1949 est.) 36,400.

SANTA CRUZ, city, California, and Santa Cruz County seat, altitude 15 feet; on Monterey Bay; on the Southern Pacific Railroad; by rail, 81 miles south of San Francisco. In the surrounding area are farms and nurseries, orchards and vineyards; the Santa Cruz mountains are timbered, and the handling of lumber is one of the city's major industries. In and about Santa Cruz cement, leather, fishing, and bulb-growing furnish fields for enterprise; and resort business is an important item. Besides the public and parochial schools, with one senior and two junior high schools, there are many churches and several hospitals, including one county institution; a public library and a museum. Together with the usual civic, social, and service clubs, the city has an art league and a music club. There is a municipal pier as well as a municipal recreation ground. The Mission of Santa Cruz (the Holy Cross) was founded in 1791; it was secularized in 1834. Whaling ships used frequently to put in here to buy green food for the crews, in order to check the ravages of scurvy. By 1840, with trade in redwood lumber, Santa Cruz began to prosper. It received a city charter in 1866. Its government is of the commission form. Pop. (1940) 16,896; (1950) 21,970.

SANTA CRUZ, the name of several municipalities, Philippine Islands: (1) capital of the Province of Laguna, Luzon, on the southeast shore of Laguna de Bay, at the mouth of the Santa Cruz River, 34 miles southeast of Manila. It is connected by highway, railroad, and boat with Manila and is an important trading center for rice and sugar. It was made the capital of the province in 1858. Pop. (1948) 17,649.

(2) municipality, Province of Marinduque, on the northeast coast, 18 miles east of Boac. The town lies about a mile and a half from the shore, and three miles from the anchorage ground. It is a port of entry for coasting vessels, and the anchorage is well protected. It is surrounded by a fertile agricultural country. Pop. (1948) 24,537.

(3) municipality, Province of Zimbales, Luzon, on the coast, 30 miles north of Iba. Pop. (1948) 11,194.

(4) municipality, Ilocos Sur Province, Luzon, on coast highway, 34 miles south of Vigan. Pop. (1948) 12,948.

(5) municipality, Davao Province, Mindanao, 21 miles southwest of the city of Davao, on the Gulf of Davao. It has an excellent harbor. Pop. (1948) 33,808.

SANTA CRUZ, river, Argentina, about 250 miles long. It flows east out of Lake Argentino in the western part of Santa Cruz territory and empties into the Atlantic Ocean at Santa Cruz.

SANTA CRUZ, river, Arizona and Mexico. It rises in the Patagonia and Huachuca mountains in southern Arizona, and flows south into Sonora, northwest Mexico, turns north to Tucson and then northwest and flows into the Gila River. It is used for irrigation in Pima County, Arizona.

SANTA CRUZ DE TENERIFE, krōōth ~~th~~a tā-nâ-rē'fâ, city, Canary Islands, capital and commercial port of the Canary Islands (Province of Santa Cruz de Tenerife), on the northeast coast of the island of Tenerife. Many of the houses are handsome, and of one and two stories high; but the majority are low. The streets are well paved, and lighted by electricity. There is a square, surrounded by wooden edifices, and adorned with a colossal statuary group representing the apparition of the Virgin of Candelaria to the Guanches, the original inhabitants. Besides

the custom house and the military hospital, there are scarcely any public buildings; the church of San Francisco is the finest. The harbor, which is very secure, has a magnificent mole, of modern construction; other works, including a breakwater, have recently been constructed. Tomatoes, bananas, potatoes, wine, brandy and cochineal are the chief articles exported; and the imports consist largely of manufactures, with coal, grain, and flour. Pop. (1941 est.) 73,299.

SANTA CRUZ ISLANDS, island group, in South Pacific Ocean, administratively attached to the British protectorate of the Solomon Islands. They are north of the New Hebrides and 240 miles off the southern part of the Solomon Islands. The group comprises about a dozen small islands with a combined area of 380 square miles. The larger islands are volcanic and mountainous. Most of them are surrounded by coral formation. The climate is hot, humid and unhealthful but the soil is very fertile and the vegetation luxuriant. The largest island is Ndeni.

The inhabitants are chiefly Polynesians who are supported partly by their plantations of coco palms, partly by fisheries, and by trading with neighboring islands.

The archipelago was discovered in 1595 by Mendana. In World War II it was the scene of a naval engagement, Oct. 26, 1942, in which American vessels and carrier planes defeated the Japanese but suffered loss of the *Hornet*. Pop. (1931) 5,080.

SANTA FE, fā, or **SANTA FE DE LA CRUZ,** Argentina, capital of the province of the same name, near the junction of the Salado with the Paraná, 299 miles by rail northwest of Buenos Aires. It stands on an eminence which is prominent in a district otherwise level. The Cabildo, the most important building, stands on the plaza or main square. Santa Fé is the seat of the governor, legislature, and the bishop. There are several churches and monasteries, also a normal school for teachers. Hides and timber form the chief articles of trade. The principal industries are cloth, choel, soap, quebracho-wood factories; flour mills, tanneries, chemical plants. Pop. (1943 est.) 149,926.

The province of Santa Fé covers 52,056 square miles, and has a rapidly increasing population. Rosario (q.v.) is the largest city. There are vast numbers of cattle, sheep and horses on extensive farms, and many acres of land are planted in cereals. Pop. (1943 est.) 1,613,586.

SANTA FE, săn'tà fā', city, New Mexico, capital of the state and seat of Santa Fe County, is located at an altitude of about 7,000 feet in the northern Rio Grande Valley in north central New Mexico. Through the city flows the Santa Fe River, a tributary of the Rio Grande. Santa Fe's 30 square miles are surrounded by snow-capped mountains—the Ortiz, the Sandia, the Jémez, and the Sangre de Cristo at the foot of which the city nestles. Santa Fe lies 62 miles northeast of Albuquerque, 35 miles southeast of Los Alamos, and 66 miles west of Las Vegas, by highway. No railroad serves the city directly; but the main line of the Atchison, Topeka and Santa Fe passes through Lamy, 18 miles south of it, and there is direct connecting motor-bus extension service to Santa Fe. The city has its own municipal airport with scheduled airline service. Santa Fe is a shipping center for piñon nuts, and for the products of local handicrafts almost all of which are produced in shops employing less than a half dozen people each. It is not an industrial city. It is important, however, not only as a political center but also as a center for archaeologists and other scientists, and it is a paradise for tourists who flock to it from all parts of the country.

Santa Fe is the second youngest of the state capitals, yet it is the oldest seat of government within the national boundaries. Above it, at different times, have flown the flags of Spain, Mexico, the Confederacy, and the United States.

History.—During the winter of 1609–1610, Pedro de Peralta, the third Spanish governor of the Province of New Mexico, founded Santa Fe as his capital. He named it *La Villa Real de la Santa Fé de San Francisco de Asis,* or The Royal City of the Holy Faith of St. Francis of Assisi, shortened through the years to Santa Fe. Here he built his palace-fortress, laid out a public square, and walled it with adobe. A pack train service, called the Mission Supply, was started at once between Mexico City and Santa Fe to provide settlers and missionaries in the province every three years with materials they could not obtain on the frontier. By 1617, there were 11 mission churches in the province, which stretched from the Mississippi to the Pacific and an indefinite distance northward, but there were only 48 Spanish soldiers and settlers. Although the Mission Supply continued to arrive regularly, it brought few colonists with it, and growth was slow. Friction between the civil and ecclesiastical authorities was a handicap almost from the beginning, and Indians were exploited by both groups. Trouble with the Indians developed, and in 1680 a plot was discovered to drive out—or wipe out—the settlers and destroy Santa Fe. The discovery did not save all the Spaniards, but settlers near Santa Fe managed to reach it before the Indians laid siege. Several days later, the Spaniards executed a surprise attack. After killing some of the Indians and putting the rest to rout, Santa Fe was abandoned. The Indians took it over, burning churches and destroying records. (Most of the later records of Spanish rule were also lost in the 1800's.) The Indians held Santa Fe until 1692 when 300 Spaniards, led by Gov. Diego de Vargas, retook it practically without opposition, and subdued other Indians in the province. (Since 1712, the reconquest has been celebrated annually in Santa Fe by a three-day *fiesta* during which the formalities of the event are re-enacted before the Palace of the Governors.) Vargas returned to Mexico and in 1693 brought back from Santa Fe soldiers, missionaries, and 70 families of settlers.

Beginning in 1739, French colonial traders began to find their way to the city; and in 1792 the first round trip was made over the route which later became the famous Santa Fe Trail, connecting New Mexico's capital with the northern cities of the United States. Mining operations had been carried on in the hills around Santa Fe since its early days, and Mexico had hardly secured its independence from Spain when traders from the United States arrived and regular trade was established. They brought American manufactures and exchanged them for gold, silver, and furs. In 1834, a Spanish-

language newspaper made its appearance, the first within the present bounds of the state; and the treaty which ceded New Mexico to the United States was not even signed before an English-language newspaper was published. In 1849 a stage line carrying mail and passengers was opened, giving the city regular connections with Independence, Mo., and increasing the number of *anglos* in the territorial capital. After the Roman Catholic Vicarite Apostolic of Santa Fe was established in 1850, parochial education was expanded, and English-language schools were opened. The year 1851 saw Santa Fe the official capital of the territory, and a national bank was organized there in 1870. Like the famous Pony Express, a similar one instituted in 1861 between Santa Fe and Denver was short-lived; but wagons carried mail, passengers, and freight over the route until 1880, when a spur of the railroad reached the city. By this time, its population had grown to 6,635 and, although many *anglos* resided there, the city was predominantly Spanish in culture, and its homes and almost all other buildings were of adobe in the Spanish-pueblo style. In the next 30 years population declined somewhat but more buildings in "foreign" styles were erected. Santa Fe continued as the capital when New Mexico was admitted as a state in 1912; and, with its status now assured and state activities expanding, population increased. It was about this time that artists from other parts of the country began to establish homes in and around Santa Fe. They liked this city with its Spanish atmosphere and its narrow, winding streets; but businessmen wanted to modernize it. The city was divided over the issue; but the idea of preserving its unique qualities prevailed, and the increasing amount of wealth that has been brought into Santa Fe by new residents and tourists who enjoy its cultural atmosphere and climate have justified the decision.

Government.—The city government is of the mayor-council type, with the mayor directly elected by the people and eight councilmen elected by their wards. By common, unwritten consent, the mayor and half of the councilmen are of Spanish-American background. The city not only owns and operates the airport, but also the sewage treatment plant of the city.

Educational and Religious Facilities.—In addition to the public school system and Catholic parochial schools, the educational institutions in the city include the Allison-James School (Presbyterian, for Spanish-speaking youth), St. Michael's College (Catholic, for men), the Seminary of the Immaculate Heart of Mary (Catholic, preparatory), the New Mexico School for the Deaf, a United States Indian school, and the Hill and Canyon School of the Arts. Santa Fe has 11 Protestant and 4 Catholic churches, and is the seat of a Catholic archdiocese.

Cultural Facilities and Points of Interest.—For music and dramatics, there are such organizations as the Community Concert Association, the Sinfonietta and Chorale Society, and a Little Theater, as well as a professional theater in summer. The Catholic cathedral contains a museum of ecclesiastical art. The Museum of Navajo Ceremonial Art, a privately owned institution housed in a modern interpretation of a Navajo ceremonial lodge, is reputed to contain the most important collection of reproductions of Navajo sand paintings in the world. The Art Gallery of the Museum of New Mexico, a modern structure faithful in style to the old Spanish-pueblo architecture, displays a fine permanent collection of Southwestern art and presents a special exhibition during the *fiesta* each year. Another building of the Museum of New Mexico is the old Palace of the Governors, which houses the School of American Research (a nonprofit corporation devoted to the study of man on the American continents), and the Historical Society of New Mexico, and it exhibits a wealth of archaeological and historical materials of the Southwest. In this long, low, walled building, Gen. Lewis Wallace resided when he was New Mexico's territorial governor, and here he wrote the final chapters of his famous novel, *Ben Hur*. Although the palace has gone through many renovations and at least one major restoration, it has stood on its present site since Peralta built it. Other buildings of the Museum of New Mexico are the Hall of Ethnology, the Laboratory of Anthropology, and the Museum of International Folk Art.

South of the palace is the Plaza, or public square, dating from Paralta's time but now much altered. In the Plaza, with its lawns, shade trees, walks, and bandstand are markers indicating where the Santa Fe Trail ended and where the proclamation was read which stated that New Mexico had been annexed to the United States. Among the Catholic churches and missions of the city are some that date dack to the 1600's and contain valuable paintings and other works of art. The Cathedral of San Francisco de Asis, built (1869–1886) of local sandstone in French Romanesque style, was erected around a parish church known as the Parroquia, which is believed to have been built on the site of a still earlier church erected 1622–1627.

Population.—The population of Santa Fe is about evenly divided between people of Spanish and non-Spanish background. Numbers of Indians may be seen within the city, but most of them live in nearby Indian villages and come to Santa Fe to work or sell their wares. Pop. (1950) 27,998.

SANTA FE TRAIL, The, an historically famous overland trade route over which originally merchandise, and later both passengers and merchandise, were transported from points in Missouri to Santa Fe, New Mexico, in wagons, which, on the return trip, brought back furs, silver and other products of the Southwest. Before the opening of the trail, merchandise was carried to Santa Fe on the backs of mules from far away points in Mexico, inasmuch as the Spaniards summarily prohibited trade with the United States. Mexico gained its independence in 1821, and in 1822 William Becknell, who in the previous year had freighted goods by pack horses from Missouri to New Mexico, arrived in Santa Fe from Franklin, Mo., with 21 men and three wagonloads of goods which he sold at a tremendous profit. He thus came to be known as "the father of the Santa Fe Trail," which others soon followed. Becknell followed the divide between the tributaries of the Kansas and the Arkansas rivers to the great bend of the Arkansas, then followed the Arkansas almost to the mountains before turning south to Santa Fe. This became the Santa Fe Trail of history, though later a shorter route through the Cimarron Valley was opened. The Trail passed into disuse with the coming of the railroads in 1880.

SANTA MARIA, săn'tà mà-rē'à, city, California, in Santa Barbara County, 74 miles northwest of Santa Barbara; altitude 231 feet above sea level. Transportation is supplied by bus lines and regularly scheduled flights both northbound and southbound by Southwest Airways. It is served, so far as freight is concerned, by one of the country's few privately owned railroads—the Santa Maria Valley Railroad, which connects with the main line of the Southern Pacific Railway about ten miles to the west.

Agricultural activities in the Santa Maria Valley are extensive and widely diversified. One of the chief products is flower seeds. About half of the world's flower seeds are packaged for sale here. Dairying and cattle ranching are also important economic activities. Since its discovery in 1902 oil has also played an important part in the economy of the Santa valley. New fields are constantly being explored and opened.

In addition to excellent city schools, there is a junior college and the University of Southern California College of Aeronautics is located in Santa Maria at Hancock Field. There are two daily newspapers and one weekly, and three radio stations.

History.—First settled by white people in 1840, the town was platted and organized as a village in 1874, under the name of Central City. In 1882 the post office changed the name to Santa Maria and incorporation as a city was effected. The government is by mayor and council. Pop. (1950) 10,440.

SANTA MARIA, săn'tà mä-rē'ä, municipality, Philippine Islands, in Bulacan Province, Luzon, 10 miles east of Malolos, 15 miles north of Manila. It is the center of a rich rice and fruit region. It has good roads and is near the Manila Dagupan Railroad. There are also facilities for water transportation.

The area suffered great damage during the Philippine insurrection of 1899, as it was the military center of the insurrectionists, and was burned by American troops. Pop. (1948) 17,509.

SANTA MARTA, săn'tä mär'tà, seaport, Colombia, capital of the Department of Magdalena, situated on the north coast near the mouth of the Magdalena River. It is a rich banana producing area. Founded in 1525, it was important in the Spanish era. Pop. (1944 est.) 25,113.

SANTA MAURA, săn'tä mou'rä, or **LEUKAS,** Greece (ancient LEUCADIA), an island of the Ionian group off the western coast, from which it is separated by a strait which was rendered navigable in 1903 by a canal cut through the sandbanks which block the shallow channel. It covers an area of about 180 square miles, is mountainous, the ranges running north and south and terminating in the white cliffs from which the island derives its name.

SANTA MONICA, săn'tà mŏn'ĭ-kà, city, California, in Los Angeles County, altitude from sea level to 300 feet; on Santa Monica Bay, an arm of the Pacific Ocean. It is served by the Pacific Electric Railway, by federal and state highways, and has a municipal airport. Located here are offices for transcontinental airlines, railways, and buses. Eight miles distant is the Los Angeles airport. Santa Monica is a busy trading center for the surrounding area. It has smart shopping districts, attractive homes, modern hotels, fine beaches, and excellent recreational facilities.

The 175 manufacturing plants are engaged in light industries which include the making of aircraft, machine tools, dies, toys, boats, fishing tackle, leather goods, ceramics, television, footwear, furniture, cosmetics, woodworking, and sportswear.

There is a fine public library with two branches, nine elementary schools, two junior high schools, a senior high school, three parochial schools, and five private schools. The University of California (UCLA) is two miles east of city limits and Loyola University is four miles south of the city. There are three newspapers—one daily and two weekly. There are extensive cultural activities—the Santa Monica Symphony Orchestra is well known.

History.—Legend ascribes the name of Santa Monica to Gaspar de Portola's Spanish scouts. One soldier watching a small waterfall drop into the shadow compared the sparkling waters to the tears of St. Monica, shed for her wayward son, Augustine. The city was founded in 1875 and incorporated in 1886. It has council-manager government. Pop. (1940) 53,500; (1950) 71,595.

SANTA ROSA, săn'tà rō'zà, city, California, and Sonoma County seat, altitude 150 feet; on Santa Rosa Creek; on the Northwestern Pacific motor stage lines, and the Petaluma and Santa Rosa Electric Railroad; by rail, 54 miles north of San Francisco. It is in a rich agricultural region, producing fruits, grains, and vegetables. In addition to its stock-raising and dairy-farming interests, Santa Rosa has varied industries, the leading ones are: the making of shoes, macaroni, and chemical products; it also has tanning and egg-packing plants, and planing mills.

In addition to the public and parochial schools, Santa Rosa has a junior college, a college of commerce, and the Ursuline College for girls.

Points of interest are the home and gardens of the late Luther Burbank, scientist and breeder of plants; a church built from a single redwood tree; an old fort, kept up as a relic of the Russian occupation; a petrified forest; geysers; wineries, and the Redwoods State Park, with its forest theater. Pop. (1940) 12,605; (1950) 17,902.

SANTA TECLA, săn'tà tā'klä, a picturesque town in Salvador. See NUEVA SAN SALVADOR.

SANTAL PARGANAS, sŭn'täl pŭr'gà-näz, district, Indian Union, Bhagalpur division, eastern Bihar Province, bounded on the north and partly on the east by the Ganges; area, 5,480 square miles (1941). The district is named from the Santáls, who form the most characteristic portion of its inhabitants, and are also found elsewhere in India. They are one of the aboriginal races belonging to the Dravidian stock, are dark-colored, and mostly profess a religion of their own, in which the worship of a chief deity and subordinate deities and a sort of ancestor worship play a chief part. They live chiefly by hunting, and are exceedingly fond of flute-playing, dancing and singing. The Church Missionary Society and the Scandinavian Home Mission have succeeded in improving their condition and promoting education among them. The district is

crossed by lines of the East India Railway. It contains the old Mohammedan city of Rajmahal on the Ganges and also Deogarh, the Hindu place of pilgrimage. The capital is Dumka. Pop. (1941) 10,811; of district, (1941) 2,234,497.

SANTALS, or SANTHALS. See SANTAL PARGANAS.

SANTANA, sän-tä'nä, **Pedro,** West Indian soldier and politician: b. Hineha, Santo Domingo, June 29, 1801; d. there, June 14, 1864. A lawyer and wealthy landowner, he joined the revolt against Haiti in 1844, soon rising to command of the insurgent army. He was elected president of the "independent State of Spanish Haiti" in November 1844 for a four-year term. After his term ended he was recalled (1849) to repel Haitian aggression. Re-elected to the presidency in 1853 he served until 1857, repelling two more Haitian attacks in the interim. He seized the government in 1858, but despairing of maintaining order, agreed to the country's annexation to Spain in 1861.

SANTANDER, sän-tän-dār', **Francisco de Paula,** Colombian soldier and statesman: b. Rosario de Cúcuta, New Granada, April 12, 1792; d. Bogotá, May 5, 1840. For his services in the war of liberation he was promoted general of division (1817) and especially distinguished himself in the victory of Simon Bolívar at the Battle of Boyacá (Aug. 7, 1819). When the Constitution of Colombia was adopted in 1821 he was inaugurated vice president, Bolívar being president. Re-elected in 1827, he led the opposition to Bolívar, was deposed by the latter (1828) and sentenced to death, but was reprieved and exiled. After serving as president of New Granada (1832–1837), he ended his life as a member of Congress.

SANTANDER, department, Colombia, situated in the north central part of the country, between Venezuela and the Magdalena River. Area, 12,382 square miles. Its capital is Bucaramanga. The greater part is occupied by the Eastern Cordillera of the Colombian Andes, which runs lengthwise through the department. The range is cut near the middle by the deep valley of the Sogamoso River. Only the uplands are inhabited; the lowland along the Magdalena is an unhealthful and densely forested wilderness. The chief products are sugar, coffee, cacao, tobacco, cotton, rice and wheat. The mountains, however, are rich in minerals, including gold, silver, iron, copper and coal. Pop. (1950 est.) 756,420.

SANTANDER, Spain, (1) capital of a province of that name, and one of the chief ports of the Peninsula, 207 miles by rail north of Madrid, near the Bay of Biscay. The principal modern buildings are the town-hall, theatre, market, barracks, bull-ring, clubs, civil and military governor's residences, the institute and other schools, custom-house and hospitals. There are numerous open squares and magnificent promenades, notably that of "Paseo del Sardinera," which leads to the bathing establishment. The higher and lower town are direct antipodes in point of architecture and general construction. The cathedral, of Gothic type, has a fine crypt containing a Moorish font. The chief features of the city are its quays and factories. There are shipyards, paper-works, foundries, extensive breweries, sugar refineries, manufactories of sails, hats, candles, vermicelli, phosphorus, sulphuric acid, fish-curing establishments, etc. The principal export is iron ore, in normal years, chiefly sent to Great Britain and Germany. Other exports are wine, flour, provisions, etc. Santander was probably the ancient Roman *Portus Blendium.* The town was sacked by the French under Nicolas Jean de Dieu Soult in 1808. Pop. (1940) 84,971.

(2) The Province of Santander, on the north coast of Spain, covers an area of 2,044 square miles. It is enclosed on all sides but the north with lofty summits and traversed by railroads of various kinds. It possesses extensive forests and important mines of iron and lead; it also produces large quantities of grain. The industries of mining, sylviculture and agriculture are steadily improving. Livestock is abundant and valuable, especially in the highlands. Pop. (1940) 393,044.

SANTAYANA, sän-tä-yä'nä, **George,** Spanish poet and philosopher: b. Madrid, Dec. 16, 1863; d. Rome, Sept. 26, 1952. Brought by his father to Boston in 1872, he acquired his lifelong love of English poetry at the Boston Latin School. Graduating at Harvard in 1886, he obtained his master's degree and doctorate in Germany, then joined the Harvard faculty in 1889 as an instructor in philosophy, becoming full professor in 1907. Like his contemporary Charles T. Copeland, he preferred the companionship of his students to that of faculty colleagues, and the students reciprocated with unbounded admiration for his lucid intelligence, detached skeptical views, and mordant wit. Through these associations he acquired his understanding of the Puritan mentality of Boston and Cambridge society, delineated a quarter of a century later in *The Last Puritan* (1936), "a memoir in the form of a novel." Retiring from his professorship in 1912, he lived at Oxford until the end of World War I, then removed to Rome where he remained until his death.

With Josiah Royce and William James he ranks among the great Harvard philosophers of the end of the 19th and early 20th centuries. Though born a Catholic and loving the beauties of Catholicism, he was not a believer; yet his *Idea of Christ in the Gospels* (1946) was described by a reviewer as "the most devout book ever written by an unbeliever." In it he attempted to justify religious myth on intellectual grounds. Among the poetic works which established his reputation before he left the United States are *Sonnets and Other Poems, Lucifer—A Theological Tragedy,* and *The Sense of Beauty.* In 1940 he published a new edition of his *Egotism in German Philosophy,* emphasizing earlier criticisms of the Nazi philosophy. Columbia University awarded him in 1945 the Nicholas Murray Butler gold medal, given for the most distinguished contribution to philosophy, or educational theory, practice or administration made anywhere in the world during the prior five years. Two volumes of his autobiography, *Persons and Places,* were published in 1944 and 1945; the third and last was completed but not published at the time of his death.

SANTEE RIVER, S. C. See WATEREE RIVER.

SANTERRE, sän-târ′, **Antoine Joseph,** French revolutionary politician and general: b. Paris, March 16, 1752; d. there, Feb. 6, 1809. In 1789 he took part in the storming of the Bastille, and in 1792 he led the Parisian Garde Nationale in the attack on the Tuileries. With the rank of field marshal, he guarded the royal family until their execution. After his forces were defeated by the Vendeans in 1793 he was arrested an an Orleanist; he did not gain his release until the fall of Robespierre. Thereafter he lived in retirement.

SANTIAGO, sän-tyä′gō, or **SANTIAGO DE CHILE,** city, Chile, capital of the republic and of Santiago Province, on the Mapocho River 116 miles east-southeast of Valparaiso. It stands on a plain 1,706 feet above sea level, westward of snow-clad Andean peaks. The city is the seat of an archiepiscopal see; the cathedral was destroyed in an earthquake in 1647 and was rebuilt in 1748. Notable buildings include the presidential palace, the capitol, the national museum, the national library (containing 500,000 volumes), and the national conservatory of music. The University of San Felipe was founded in 1747 and closed in 1839; in 1842 it was refounded as the University of Chile. The fourth largest city of South America, it has varied manufactures. Pedro de Valdivia, the Spanish conqueror of Chile, founded the city in 1541. It figured prominently in the wars of liberation and became the capital of a free Chile after the Battle of Maipo, April 5, 1818. Earthquakes and other natural disasters have visited the city on several occasions. Pop. (1948 est.) 1,144,000.

SANTIAGO ATITLAN, sän-tyä′gō ä-tē-tlän′, or **ATITLAN,** town, Guatemala, in Solala Department, situated on the south shore of Lake Atitlan. Medicinal springs are found in the neighborhood. Pop. (1940) 6,742.

SANTIAGO DE COMPOSTELLA, sän-tyä′gō*th*ä kôm-pōs-tā′lä, town, Spain, in La Coruña Province 32 miles southwest of La Coruña. The cathedral, erected during 1082–1128, is said to have been built on the site of the grave of the apostle Saint James and to contain his bones; long and most frequented place of pilgrimage in western Europe, the city acquired the popular designation of the "Mecca of Spain." A hospice for pilgrims was founded in 1504 by Ferdinand and Isabella, and the university dates from 1532. The great Benedictine convent of Saint Martin has been converted into barracks. Formerly the city was the capital of Galicia. There are mineral springs in the vicinity. Manufactures include linen, silverware, spirits, chocolates, and paper. Pop. (1949) 56,740.

SANTIAGO DE CUBA, sän-tyä′gō *th*ä kōō′vä, seaport, Cuba, capital of Oriente (formerly Santiago de Cuba) Province, on a landlocked bay on the south coast, 540 miles east-southeast of Havana (La Habana). The bay, 6 miles long and 3 miles in width, is connected with the Caribbean by a long, winding channel. Mines of copper, iron, and manganese are worked in the vicinity. The city was founded in 1514 by Diego Velásquez (Velázquez), conqueror of Cuba, who was buried in the cathedral. From 1522 until 1589 it was the capital of the island. French invaders plundered the seaport in 1553, and British in 1662. Military operations were conducted in the vicinity during the Spanish American War; outside the harbor, on July 3, 1898, the Spanish fleet was destroyed, and on July 17 the city was surrendered to United States forces. Pop. (1943) 118,266.

SANTIAGO DE LOS CABALLEROS, sän-tyä′gō *th*ā lôs kä-vä-yā′rōs, city, Dominican Republic, capital of Santiago Province, 80 miles northwest of Ciudad Trujillo (Santo Domingo). It is in a fertile agricultural area producing cacao, coffee, and tobacco. Pop. (1948 est.) 62,527.

SANTIAGO DEL ESTERO, sän-tyä′gō *th*ĕl ās-tā′rō, city, Argentina, capital of Santiago del Estero Province (52,222 square miles), on the Dulce River about 88 miles southeast of Tucuman. The city, founded in 1553, contains an interesting church and Franciscan convent dating from about 1590. Pop. province (1947) 574,383; city (1944) 76,445.

SANTILLANA, sän-tē-lyä′nä, **Iñigo Lopez de Mendoza,** MARQUES DE, Spanish poet: b. Carreon de los Condes, Aug. 19, 1398; d. Guadalajara, March 25, 1458. He was a powerful figure at the court of John II of Castile. Commencing as an imitator of the early troubadors, he composed numerous *serranillas* (mountain songs) notable for their simplicity, naturalness of tone, and poetic beauty of form and expression. He was less successful in gaining popularity for his didactic poetry and his imitation of the Italian poets, especially Dante. Nevertheless, such didactic poems as *Dialogo de Bias contra fortuna* and *El Centiloquio* are particularly graceful, beautiful in form, and vigorous in style. He introduced into Spain the Italian form of the sonnet, and produced excellent imitations of Petrarch; and he was one of the first Spanish writers to dig into the mine of literary wealth of Giovanni Boccaccio. His Vaqueira pastorals included *Proverbios de gloriosa doctrina e fructuosa ensenanza* and *Comedieta de Ponza.*

SANTO DOMINGO, săn′tō dō-mĭng′gō, the early name of the island of Hispaniola (q.v.), and former name of the Dominican Republic (q.v.) and of its capital, now known as Ciudad Trujillo.

SANTO TOMAS, sän′tō tō-mäs′, town, Philippine Islands, on Luzon, in Batangas Province northeast of Lake Taal (Bombon), 10 miles south of Laguna de Bay. It is at the western base of Mount Maquiling. Pop. (1939) 16,544.

SANTO TOMAS, Mount, a mountain of Philippine Islands, on Luzon, south of Baguio, in the southern part of Benguet subprovince of Mountain Province. The western side of the mountain, 7,406 feet in height, slopes rapidly to the coast.

SANTONIN, săn′tō-nĭn, a proximate principle ($C_{15}H_{18}O_3$), the active principle of santonica, possessing acid properties; it is obtained from wormseed, the seed of a species of southernwood. It is colorless, crystallizable, and soluble in alcohol, and in the fixed and volatile oils; it is bitter, and is one of the most efficacious vermifuges for roundworms. Its administration

produces changes in the urine and also affects the vision for a few hours; but no ill results follow.

SANTORIN, sän-tō-rēn′, **THERA,** or **CALLISTE,** Greece, the largest of one of the island groups in the Ægean Archipelago, 60 miles north of Crete. It has an area of 27 square miles. The eastern slope is covered with vineyards; the western shores are precipitous, with deep ravines and volcanic indications. The town occupies the lofty heights overlooking precipices. The wines of the island are the chief staple and are called *vino-brusco* and *vino-santo.* Various eruptions have occurred in the vicinity which from time to time have changed the surrounding topography. There are practically no trees and the water supply often fails, it becoming necessary to procure fresh water from neighboring islands. There are many ancient remains, and excavations have brought to light numerous inscriptions of the Mycene and early periods. Pop. 20,000. Consult von Gaertringen, Hiller et alia, 'Thera, Untersuchungen, Vermessungen und Ausgrabungen in den Jahren 1895–98' (Vols. I–IV, Berlin 1899–1902); and 'Inscriptiones Græcæ Insularum Maris Ægæi' (Vol. II, ib., 1898).

SANTOS, sän'toos, Brazil, city in the state of São Paulo, on the Atlantic Coast, 200 miles southwest of Rio de Janeiro and 45 miles from the city of São Paulo. The immense export and import trade of the interior region which it serves has made it one of Brazil's two leading ports. The city lies about five miles up a winding tidal river along which, on the west bank, are built the docks, comprising three to four miles of quays, backed by over two score warehouses. The quays have facilities for docking more than 30 large steamers. The system of warehouses is linked to the São Paulo Railway terminal by a light railway. Santos has outstripped Rio de Janeiro in its exports by reason of its enormous coffee shipments. It is the largest coffee port in the world and is the outlet for the vast coffee production of São Paulo province. The annual exportation is about 9,000,000 bags, or 540,000 tons per year, with a value of over $260,000,000. Although coffee is the chief article of export, Santos has also a large export trade in hides, cacao, tobacco, frozen meat, bananas, and other commodities. Situated on an island, Santos is protected from the ocean by a larger island, with a channel six miles long between the two. A sea wall three miles long has been constructed on the side of the city. This made possible the reclaiming of much pestilential and malaria-breeding swamp-land, from which the health of the city has been greatly benefited. Yellow fever is no longer endemic. The city is well built, has many fine streets and boulevards. Churches crown the heights of Monserrate. There are several monasteries, a city hall, custom house, two hospitals, an arsenal, banks, electric-lighting plants, electric street railways, gas and modern water supply system. A fine monument commemorates the brothers Andrade, heroes of the revolution of 1822. A railway connects the city with São Paulo and the interior. The population is given as about 80,000. Consult 'Encyclopedia of Latin America' (New York); 'Commercial Travelers' Guide to Latin America' (Department of Commerce, Washington); James, H. G., 'Brazil After a Century of Independence' (1925).

SANTOS, sän'tzŏz, **Francisco,** Spanish writer: b. in the first half of the 17th century in Madrid; d. about 1700. He published, between 1663 and 1697, 16 volumes, principally of short stories, intended, as the author professes, for popular amusement. 'Dia y noche en Madrid,' the first of this series, contains many excellent and startlingly graphical pictures of life in the capital of Spain. 'Perequillo, el de las guallineras' (Madrid 1668), a story written in opposition to the picaresque novels still extensively read in his day, was also popular and is still read in Spain. 'Verdad en el potro y el Cid resuscitado' (Madrid 1679) is of interest on account of the songs and popular ballads it contains, many of which date back to an early period of Spanish literature, and some of which differ from all other known versions. Among his other popular stories are 'El diablo anda suelto' (Madrid 1677); 'El vivo y el defunto' (Madrid 1692); 'Tarascas de Madrid y tribunal espantoso' (Valencia 1694); and 'Los Gigantones de Madrid.' Few of Santos' stories now appear in their original form because the literary taste of the Spanish people has changed since his day; but they have been recast by other authors and the ideas contained in many of them have been made use of by some of his successors in the literary field. Consult any good history of Spanish literature.

SANTOS CHOCANO, zho'kän-ō, **José,** Peruvian poet: b. 1875. Since the death of Rubén Darío (q.v.) in 1916, Santos Chocano has been the undisputed leader of Latin American literature; and even before the disappearance of the latter from the scene, Santos Chocano had become a figure at least equal in importance with him on the literary horizon. He influenced Darío strongly and for the better, by enlarging his view and making him, in his latter years, more cosmopolitan. It was through Santos Chocano that Darío was led to see the United States and the American people with other and more favorable eyes. Endowed with a broad vision, he threw behind him, early in his career, all sectionalism and local views, which had hampered most of the preceding Latin American poets and prose writers, and announced himself the apostle of cosmopolitanism and Pan-Americanism. At a time when other younger poets like Rubino Blanco Fombona of Venezuela made it their special business to vilify the United States and all things American and to hold her people up to ridicule as uncouth, uncultured, rude dollar-grabbers, overbearing and unbearable, Santos Chocano proclaimed himself the singer of America in all its varying moods and phases, past and present. He sang, 'My lyre has a soul, my song an ideal.' The sound of his lyre was America; the ideal of his song the unity and harmony of all things American. In his 'El Canto del Porvenir' (Song of the Future) he sees the spiritual union of the North and the South, of the Latin and the Saxon. He believes the one is necessary to the other, and that they have been placed together in the Western world for a purpose. Santos Chocano has the truest vision of all the Latin American writers; and his influence, which has

become very widely extended, has been generally exercised for good. His 'Alma America,' in which he emphasizes the idea of race unity on the Western continent, is a stirring poem which became immensely popular and exercised a strong influence on the younger poets of Latin America. Santos Chocano has become, in a sense, the leader of a new school of poetical thought, whose self-imposed task is to sing the beauties and glories of America. Though united through this ideal, the members of this school use widely different literary methods to attain their ends; and some of them are not broad minded enough to see beyond the boundaries of Latin America. Yet all of them can sing with him: «When I feel myself an Inca, I render homage to the Sun which gave me the sceptre of royal power; when I feel my Spanish blood, I evoke Colonial days.» Santos Chocano has traveled much and has found a warm welcome in nearly all the Latin American countries. Some years ago he was lionized in Mexico City, and the Central American nations have paid high tribute to his genius. Consult Coester, A., 'The Literary History of Spanish America' (New York 1916); González Blanco, Andrés, 'Select Poems of José Santos Chocano' (Introduction to 'Fiat Lux,' Paris 1908).

SANTOS DUMONT, Alberto, Brazilian aeronaut: b. Palmyra (now Santos Dumont), Brazil, 20 July 1873; educated chiefly in France, and resided almost continuously in Paris until 1928, when he returned to Brazil; Chevalier (1904) and Officer (1909), Legion of Honor. He ascended 4 July 1898 from the Jardin d'Acclimatation, Paris, in a spherical balloon 18 feet in diameter. At this time he was engaged upon the construction of a dirigible balloon which he completed so as to make the trial ascent on 20 September. It proved itself dirigible, but the experiment ended in disaster owing to the insufficiency of the air-pump. A second and a third machine were constructed, the latter being cigar-shaped, 66 feet long and 11½ feet in greatest diameter. It carried a four and one-half horsepower petroleum motor to work a five-foot propeller making 2,500 revolutions a minute. It was steered by a rudder of silk and bamboo having an area of about 25 feet. This machine ascended from Vaugirard, 13 Oct. 1899, sailed to the Champs de Mars, encircled the Eiffel Tower several times, proceeded to Auteuil and finally landed at the manœuvre grounds at Bagatelle. He continued experiments with new balloons, and on 18 Aug. 1901 his balloon collapsed and fell to the roof of the Trocadero Hotel. On 19 Oct. 1901 he won the Henri Deutsch prize of $50,000 offered for a trip from the Aero Club at Saint Cloud around the Eiffel Tower and back to the point of departure in less than an hour. The actual time employed was 29 minutes and 30 seconds, the return being made against a strong wind. In 1902 he went to Monte Carlo with the design of crossing the Mediterranean and after making several ascents suffered an accident which precipitated himself and his balloon into the Bay of Monaco. He turned from the construction of balloons, and in 1909 completed the «grasshopper» monoplane. See AERONAUTICS, HISTORY OF —*The Dirigible;* and consult his 'My Airships' (1904). Died 24 July 1932.

SANUTO (sän'oo-tō), or **SANUDO, Marin,** THE ELDER, of Torcello, Venetian statesman, traveler and geographer: b. Venice, about 1260; d. 1330–38. He traveled widely, knew the coasts and much of the interior of western, central and southern Europe, northern and eastern Africa, and southern and western Asia. He used his vast knowledge of geography and the trade routes of the world in an effort to reawaken the crusading spirit. To further the plan he wrote in 1303–07 his 'Liber secretorum fidelium super Terræ Sanctæ recuperatione' (Hanover 1611; Eng. trans., London 1896). This he presented to Pope Clement V; and in 1312–21 he was engaged upon two supplementary volumes, which when completed were presented with their predecessor to Pope John XXII, together with maps of the world and of Palestine, as well as the cities of Antioch and Acre, and charts of the Mediterranean and Black Seas and the West European coasts. The maps were probably the work of Pietro Vesconte, and on the whole compare favorably with modern maps. The books contain definite plans for the conquest of Palestine, displaying an extensive knowledge of the customs, wealth, extent and population of the countries described. There are 23 manuscript copies of the 'Secreta' in existence, of which the most important are those in the Riccardian Library, Florence; the British Museum, London; and the Paris National Library.

SANUTO, or SANUDO, Marin, THE YOUNGER, Venetian senator, historian and traveler: b. Venice, 22 May 1466; d. 1533. He was of patrician birth, and at the age of 17 went on a journey through Istria and the mainland provinces. He sought out famous people, places of interest and libraries wherever he went, copied inscriptions and made a careful and exhaustive record of his observations and experiences. Because of his exceptional ability he was elected to the Maggior Consiglio at the age of 20, five years less than the legal age, and in 1598 he became a senator. His diaries begin 1 Jan. 1496 and continue until September 1533, covering the proceedings of the legislative bodies in which he served and giving an exhaustive record of his experiences and associations during that period, filling 58 volumes. He was permitted to examine the secret archives of the state, and his friendships included the most famous and learned men of his time; so that his minute and accurate records, governed by his broad learning and rich associations, are of great value and undisputed authority. He collected a splendid library, including foreign as well as Venetian manuscripts, his activities generally fitting him for the post of historian to the republic, an appointment he greatly desired. This, however, twice passed to others, but Sanuto's services as a historian were eventually recognized by the republic through a yearly pension of 150 gold ducats. He was author of 'Itinerario in terra ferma' (London 1847); 'I Commentarii della guerra di Ferrara' (Venice 1829); 'Le Vite dei Dogi' (in Muratori's Rerum Italiacarum Scriptores,' (Vol. XXII, 1828); and the 'Diarii' (Venice 1872–1903).

SÃO FRANCISCO, säñ frän-sēs'kō, a river of Brazil, which rises in the Serra da Canastra, in the southwest of the state of

Minas Geraes, flows north-northeast through that state and the state of Bahia, then turning east forms the boundary between the states of Pernambuco and Alagoas on the north and Bahia and Sergipe on the south. It falls into the Atlantic 50 miles north-northeast of the town of Sergipe by two mouths, one to the north, called Aricari, so shallow as to be scarcely navigable even by canoes; and the other to the south, hence called Francisco do Sul, much larger and deeper, but unfortunately encumbered at its mouth by a large bar about six miles broad, covered with a heavy surf, and with seldom more than four feet of water on it. It is a large and majestic river, with a course which has been estimated at 1,600 miles, but, in addition to the bar at its mouth, has numerous rapids and cataracts, which make its continuous navigation impossible; those at Paulo Affonço, about 190 miles inland, are about 60 miles in length. Its principal affluents are, on the right, the Paraopeba, Guacuhi or Velhas, Jequitahi and Verde; and on the left the Andaia, Borrachudo, Abaité, Paracatu, Urucaia, Carinenha, Correntes and Grande. Railroads have been built around some of the rapids and in conjunction with inland steamers on the river afford continuous communication for about 1,000 miles.

SÃO JOÃO DA BARRA, säñ zhō-ooñ′ dä bär′rä, or **SÃO JOÃO DA PARAHYBA,** Brazil, a town on the Atlantic Coast of the state of Rio de Janeiro, at the northern end of the state. It is the port of Campos, with which it has railroad connection. Pop. 5,000.

SÃO JOÃO DEL REY, děl rā′ē, Brazil, a town in the state of Minas Geraes, situated 75 miles southwest of Ouro Preto, on the railroad running west from Barbacena. It was founded as a gold-mining town, but the gold has been exhausted, and the chief wealth of the town now comes from cattle raising and the manufacture of cloth and leather. Pop. 10,000.

SÃO LEOPOLDO, lā-oo-pōl′dō, Brazil, a town in the state of Rio Grande do Sul, situated on the railroad 18 miles north of Porto Alegre. The town has two churches, a Jesuit college and two high schools. It has had a considerable industrial and commercial development. Agriculture, viticulture and cattle-raising are carried on successfully in the surrounding country, and the town manufactures leather goods. The products of the town have amounted to over $6,000,000 annually, most of them going to Porto Alegre, which, besides the railroad connection, can be reached by steamboats on the Rio dos Sinos. The town was founded by German immigrants in 1824. Pop. 7,500.

SÃO LUIZ DE MARANHÃO, loo-ēzh dā mā ran yän. See MARANHÃO.

SÃO PAULO, Brazil, capital of the state of the same name, and the second city of the country in population and commercial and industrial importance. It is 304 miles southwest of Rio de Janeiro, on the São Paulo Railway. The city is on a plateau, at an elevation of over 3,000 feet above sea level. The temperature is even and moderate, and the air is bracing. The business section, containing the hotels, banks, retail shops and railway stations, is within an area called the Triangle. Two suburbs, Braz and Moorca, are given over to manufactures, and to homes for factory workers. The city has expanded rapidly in recent years. Most of the newer buildings are in the Italian style of architecture. São Paulo has many handsome public and private edifices. The municipal theatre is hardly surpassed in any other city in the world. There are many important industries, among them the manufacture of iron and steel products, textiles, shoes, beverages, cigarettes, and chemical products. Over $60,000,000 is invested in industry. There is a large trade in coffee, agricultural products, frozen meat, sugar, etc. Over 40 per cent of the population is foreign-born. São Paulo was founded by the Jesuits in 1552, and became a city in 1712. It is the site of a bishopric, founded in 1746. Pop. (1936) 1,120,405.

SÃO PAULO, pow′loo, a state of Brazil, bounded on the north and northeast by Minas Geraes and Rio de Janeiro, on the southeast and south by the Atlantic Ocean and Paraná, and on the west by Matto Grosso. Area, 91,310 square miles, including a large section of fertile but unsettled land near the Paraná River, which forms part of the western boundary. The principal mountains are between the capital of the state and Santos, Serra do Mar (average height about 3,000 feet); and, toward the interior, spurs of the Mantequeira range. Adjoining the coast is a comparatively narrow strip or zone, low-lying and tropical in its characteristics; but an abrupt ascent leads from this to the plateau which extends westward to the Paraná, sometimes cut by the valleys of the river system, sometimes rough and mountainous, but in general maintaining an altitude which ensures a temperate climate. In fact, the winters in the southern part of the state are decidedly cold, frosts occurring many times during a single season; and at the capital the temperature occasionally falls below 32° F. The fertile red soil of the plateau is peculiarly adapted to the cultivation of coffee. The railway system of this state, with that of the neighboring Rio de Janeiro (q.v.), is the best in Brazil. A notable piece of engineering is seen on the line which crosses the Cubatão range at a height of more than 2,500 feet. The principal cities are the capital, São Paulo, and the leading port, Santos. For description of the coffee industry, etc., in this state, see BRAZIL. Pop. 4,592,188.

SÃO THOMÉ, tō-mā′, or SAINT THOMAS, Africa, an island in the Gulf of Guinea belonging to Portugal, and situated a little north of the equator in long. 6° 30′ E., 150 miles northwest of Cape Lopez. Its area is 358 square miles. The whole island consists of a volcanic mountain 7,026 feet high, and heavily forested. The climate is equable, temperate and healthful, and the soil is very fertile. The chief products are coffee, cocoa, oranges, lemons, figs, grapes, pine-apples, vanilla, cinnamon, india-rubber, cinchona, etc. The exports are valued at over $10,000,000 annually. Pop. 53,969. There are nine miles of railway in operation. São Thomé forms, with the neighboring island of Principe, a Portuguese province. The capital is St. Thomas, with a safe harbor and a pop. of 3.000.

SAONE, sōn (ancient, ARAR), France, a river which rises at Viomenil, in the department of Vosges, flows southwest through that depart-

ment, traverses the department of Haute-Saône, and on entering the department of Côte-d'Or, receives the Ognon. Continuing a southwest course, past Auxonne, it receives its most important tributary, the Doubs. It flows past Châlons and Maçon to Lyon, where it joins the Rhone after a course of about 280 miles; of these 190 miles are navigable. The Canal du Centre, Canal de Bourgogne and Rhone and Rhine Canal, bring it into communication with the Loire, Seine, Meuse, Moselle and Rhine.

SAOSHYANT. See Sosiosh.

SAP, the fluid which circulates in plants, and consists of water carrying various nutritive salts in solution. This water and its contents, "crude sap," so-called, is absorbed by root-hairs and permeates the plant, passing through the woody portions of the vascular bundles, in the newer rings of the "sap-wood," which, in dicotyledons, constitutes a woody cylinder between the bark and the heart-wood or pith. This sap, by some process which is not fully understood, but which is ascribed to root-pressure, transpiration, or suction, severally or collectively, carries its raw materials to the chlorophyll granules in the green, growing parts of the plant, where they are metamorphosed into organic substances, and are again taken away through the vast cells to those places where they are needed for the life or propagation of the plant, or are stored for future use. Maple and corn sugar, india-rubber, opium and the milk of certain plants are all saps, and the products of the lactiferous cells. Many plants, such as cacti and others, living in desert regions, store away water to carry them through the droughts, a fact which is taken advantage of by travelers in thirsty lands.

SAP-GREEN, a yellowish-green pigment which is prepared by mixing the purplish-red juice expressed from the ripe berries of buckthorn (*Rhamnus catharticus*) with an alkali. The liquid is fermented, evaporated until it has reached a proper consistency, and then suspended in bladders, to harden into a brittle mass. The color is used by water-color painters, paperstainers and leather-dyers, but is very fugitive.

SAPAJOU, or **SAJOU,** a French adaptation of an Indian word, and now applied to several species of American monkeys of the family Cebidae. The sapajous live in flocks in the forests of Brazil, Peru, Guiana, Colombia and Venezuela, and possess tails of feebly prehensible powers, and feed on fruits, eggs, small birds, etc. They are familiar in habits, become soon domesticated, and are thus in favor among mountebanks, etc., who teach these monkeys to become very expert in performing tricks. Common species of sapojous are the sai (*Cebus capucinus*) and white-throated sapojou or sajou (*C. hypoleucos*).

SAPAN, or **SAPANWOOD,** red dyewoods, obtained from two genera of the *Leguminosae,* but principally from *Caesalpinia sappan.* This tree is indigenous to tropical Asia and to the Indian Archipelago, but since it gives a good, red dye, similar to that of brazilwood, although somewhat difficult to fix, its cultivation is promoted in the West Indies and Brazil.

SAPHO. Of Daudet's *Parisian Dramas* the most widely read and most intensely poignant is *Sapho* (1884). Though Edmond de Goncourt pronounced it the author's "most complete, most humane, and most beautiful story," it owed its popularity not alone to its literary merits, which are very great, but also in part to the fact that it dealt with a phase of life that has often a morbid interest for those who, from whatever cause, are precluded from experience of it. The book is dedicated significantly "To my sons when they are twenty," to be to them a warning of the perils, spiritual and material, that encompass every attempt to set up domestic life outside of legitimate marriage. Gaussin, a youth of rich promise but weak will, is betrayed by the very generosity of his eager passion into a connection with Fanny Legrand, a woman who lives by and for sex and knows no law or love but the satisfaction of her animal desire, while she clings to Gaussin with the desperation of a last passion. How through the years of this union Gaussin's young ideals, family connections, material prospects, mental powers, moral character were sacrificed, blighted and betrayed; how he was tortured in turn by jealousy and desire, clung yet shrank, became engaged to another and returned to his degradation, only to find his utter sacrifice uncomprehended, because to such as she incomprehensible—all this is shown with relentless psychoanalysis and undeviating seriousness of purpose. No lighter touches relieve the development of the inevitable tragedy, finely allegorized in an unforgettable opening scene, where the ardent young student carries his new-won mistress up the long stairs to his dwelling, first a light burden, gaily borne, then from landing to landing ever heavier, till it bears him down in utter exhaustion at the end. Consult translations by Ives, G. B., Rogerson, T. F. and others.

Benjamin W. Wells.

SAPINDACEAE, săp-ĭn-dā′sē-ē, a family closely allied to the maples, and containing the soap-berry (*Sapindus*), litchi-nut (*Nephelium*), and other genera. The species are usually tall trees or vines with watery juice. The leaves are generally compound, and alternate, evergreen and abruptly pinnate. The flowers are small, but often showy sometimes apetalous, sometimes with four or five unequal and imbricated petals, and about the same number of sepals; the stamens are eight, and are situated on a disc; the ovary is 3-celled, becoming in fruit capsular or indehiscent, or composed of several wing fruits, or a drupe, or nut, or berry. The species are mostly found in warm countries. The fruits of several, such as the *Nephelium,* are eaten, but the leaves of many are poisonous. The typical genus *Sapindus* has a very saponaceous fruit, used in the place of soap. In Brazil, a paste called "guarana" is made from the pounded seeds of the sapindaceous climbing shrub, *Paullinia cupana,* and serves for food, for medicine (since it contains caffeine), and for the preparation of a refreshing drink.

SAPODILLA, or **SAPODILLA PLUM,** an evergreen tree (*Achias sapota*) some 20 feet high with thick, shining leaves, clustered at the ends of the branches and a milky juice. It is sometimes called bully-tree, also, and is indigenous to tropical America, where it is

often cultivated for its fruit which in the West Indies is sometimes called naseberry. The flowers are small and whitish and the sapodilla, the fruit, resembles a russet apple in color and size and has a milky acrid juice, which disappears when over-ripe, leaving the fruit in a sugary condition and with a pleasant, pear-like flavor. It is a valuable food in warm countries. The seeds are large and black and used as an aperient and diuretic. The juice of the sapodilla is made into chewing-gum, the bark is astringent, and employed as a febrifuge (Jamaica bark), and the wood is reddish-brown, hard, heavy and durable.

SAPONIN, a glucoside contained in the roots of *Saponaria officinalis* or soapwort and many other plants; also in the fruit of the horse-chestnut, in quillai-bark or soap-bark, etc. By means of boiling alcohol it is readily extracted from the root of soapwort, the alcohol, as it cools, depositing the saponin as an amorphous sediment. It derives its name from its behavior with water, in which it is soluble in all proportions, yielding an opalescent fluid which froths when shaken like a solution of soap, if even one one-thousandth part of saponin be present. Its solution, or an infusion of soapwort, is sometimes employed in place of a solution of an alkaline soap for cleansing the finer varieties of wool from grease. Many preparations for cleaning kid gloves, etc., derive their virtues from saponin.

SAPOTACEÆ, săp-ō-tā'sē-ē, a large genus of trees and shrubs of the heath tribe, indigenous chiefly to the tropics and principally to the tropical islands. The leaves are entire, alternate and leathery, with flowers clustered in the axils of the leaves, or at the older stem-nodes. The flowers are regular, bisexual, with stamens borne on the corolla, as many, or twice as many, as its lobes; the calyx-lobes are rigid and obtuse, and longer than the corolla-tubes; the fruits are baccate. The *Sapotaceæ* have a milky juice which furnishes true gutta-percha (q.v.). The sapodilla and star apple of the West Indies are fruits produced by this family. The genus *Bassia* contains species valuable for the oils which they yield and the seeds of *Mimusops elengi* also yield oil abundantly. The sapotads are natives chiefly of tropical India, Africa and America; known genera 21, species 212. Consult Gray, 'School and Field Book of Botany' (1875).

SAPPAN-WOOD. See Brazilwood.

SAPPHIRE, a mineralogical name including all highly colored and transparent varieties of corundum (q.v.), except the red, which is called ruby, an exception confined chiefly to jewelers. Sapphire corundum occurs in three forms — as small, distinct crystals, hexagonal or rhombohedral in various modifications; as transparent portions of ordinary corundum; and at times as nodules or small rounded masses enclosed in ordinary corundum, though distinct. Most gem sapphires are of the first kind; but some fine stones have been cut from material of the two latter kinds, especially in the corundum workings in North Carolina, notably the Culsagee mine in Macon County. Sapphires present almost every variety of color, although blue is the most familiar, deep shades being most valued. Other blue gems occasionally seen are blue tourmaline (called Brazilian sapphire), cyanite and iolite, which is known somewhat as water-sapphire. True sapphires are, however, easily distinguished by their greater hardness (9), and density (3.95 to 4.1). The main sources of sapphire are Ceylon, Cashmere and the Pailin district of Siam, also the Anakie district of Queensland, Australia. In the United States, sapphires are obtained chiefly in Montana; first from the «bars» or low bluffs, of gold-bearing gravel, along the Upper Missouri River, east of Helena and later from a decomposed igneous dike at Yogo Gulch, in Fergus County; also at Rock Creek, Granite County and Dry Cottonwood Creek, Deer Lodge County. The river bars and Rock Creek yield a great variety of rich and delicate colors, as in Queensland, but Yogo Gulch furnishes the deep blue shades most valued and is being worked very extensively. Small and poorly colored stones are largely sold for watch-jewels. All blue and green sapphires, like rubies, possess marked dichroism, a point important to the lapidary, as the tint of gems from such crystals depends upon the direction in which they are cut. In biblical history the sapphire was a stone of an azure color (Exod. xxiv, 10) and very precious (Job xxviii, 16). It was the second stone in the second row of the high priest's breastplate, which is now believed to have been the *lapis lazuli,* and not the modern sapphire, as doubtless was also the stone mentioned in Rev. xxi, 19. Among the Greeks the sapphire was sacred to Jupiter. See Precious Stones.

SAPPHO, săf'ō, Greek poetess: b. Mitylene, or Eresus, Island of Lesbos. She was the greatest of ancient poets of her sex and flourished between 630 and 570 B.C., being a younger contemporary of Alcæus. Little is known certainly of the events of her life. On account of political commotions she left Lesbos for Sicily. But in later years she returned to Mitylene where she became the centre of a female coterie, a school of poetry of which the famous Erinna was a member. She was the author of various poems; hymns, odes, elegies, epigrams — of which only two complete pieces, an ode 'To Aphrodite' and 'To a Maiden,' together with some fragments, have come down to us; these display intense feeling, glowing imagination and a high finish. One of them is quoted in full by Longinus in his treatise 'On the Sublime.' She is said to have invented several metres; at least one still bears her name and has been used by such ancient poets as Horace and such modern ones as Canning in his 'Needy Knife-grinder.' There is an edition of the extant fragments with translations and memoir by H. T. Wharton (3d ed., Chicago 1895). Ancient papyri have recently brought other fragments of Sappho's verse to light. Consult Bergk, 'Poetæ Lyric' (Vol. III, Leipzig 1914); Edmonds, J. M., (in *Classical Review,* Vol. XXII, Vol. XXVIII, London 1909 and 1914); *Classical Quarterly* (Vol. III, ib. 1909); Hunk, A. S. (in *Classical Studies,* Vol. IX, p. 39, ib. 1915) Brandt, P., 'Sappho' (Leipzig 1905); Christ-Schmid, 'Geschichte der Griechischen Literatur' (6th ed., Munich 1912); Farnell, G. S., 'Greek Lyric Poetry' (London 1891); Wright, W. C. 'Short History of Greek Literature' (New York 1907).

SAPPHO. Following the success of his first great tragedy of Fate, 'Die Ahnfrau,' which was written in 16 days, Franz Grillparzer wrote a second poetic drama 'Sappho' (1819), also composed at white heat and resembling 'Die Ahnfrau' in the general character of its poetry although differing from it in form and spirit. In its conception it is half way between the tragedy of fate and the modern tragedy of character; in its form, too, it is half way between the classical and the modern. Out of the slight tradition which tells how Sappho, one of the greatest poets of her age, threw herself from the high Lesbian cliffs into the sea when she found her love for the youth Phaon unrequited and her own handmaiden preferred, Grillparzer has made a stirring drama, with an acting quality strong enough to carry it to success on the stage when well performed. At the same time he has developed a poetic symbolism in the story, and the conflict between the spiritually gifted Sappho and the beautiful Melitta becomes, in Grillparzer's hands, the conflict between art and the pleasures of life. Although the verse has neither the dignity nor the sheer beauty of some of Grillparzer's later work, notably 'Des Meeres und der Liebe Wellen,' it has the cumulative quality which often accompanies verse written in long stretches at a single sitting, a quality which does not detract from its distinctly dramatic value. Through the dignity and the success of his early dramas Grillparzer forged the link that bound the drama of Austria definitely to the literature of Germany.

EDITH J. R. ISAACS.

SAPPHO'S LEAP. See CAPE DOUKATO.

SAPRAEMIA. See BLOOD-POISONING.

SAPROLEGNIACEAE. See FUNGI — *Water Molds.*

SAPROPHYTES, a class of plants living on the carbonic compounds resulting from the decay of organic life. They sometimes contain chlorophyll, but generally do not, and since organs of assimilation are therefore not necessary, the leaves in many kinds are reduced to mere scales. This habit of existing only on decaying organisms makes the higher saprophytic plants very difficult to transplant. Algæ are often saprophytes, making use of the decaying refuse of the sea; and fungi, especially the molds and dung-loving genera as *Splachnum,* are the most generally known cryptogams acting as scavengers in this manner. Even the globular alga, the «red snow» (*Sphærella nivalis*), exists on the corpses of insects, pollen-grains and other decaying materials drifting across the snow. Certain other saprophytes attach themselves to the bark of trees, not to suck the juices of the host in the manner of parasites, but to subsist on the decaying bark and on the organic dust and material in solution washed down by the rain and stopped by the projecting mass of the plants. Many saprophytic plants living in the cracks of rocks have only the humus collected in tiny pockets and the supply of dissolved organic matters in percolating water, to draw upon. Some orchids, as the coral-roots (*Corallorhiza*), that have no true roots, but a thin-skinned rootstock, which absorbs nutriment directly; the familiar Indian pipes (*Monotropa*) and others spring from the humus of decaying leaves, in close connection with the hyphæ of fungi. The meadow pastures support such saprophytes as the true mushroom (*Agaricus campestris*), the moonwort (*Botrychium lunaria*) and the blue and violet flowered gentians. These micro-organisms, non-virulent and always present in animal intestines, may in certain conditions become virulent poisons. See BOTANY; FUNGI.

SAPSUCKER, the popular American name of several small woodpeckers, but properly restricted to the yellow-bellied woodpecker (*Sphyrapicus varius*), an Eastern species represented in the Rocky Mountain region by variety *nuchalis* and along the Pacific Coast by variety *ruber.* This woodpecker is of moderate size; is black and whitish above; black on breast; rump black and white mixed; belly more or less yellowish; sides streaked with dusky; crown red in the adult; chin scarlet and throat black in the male, but both white in the female. This bird illustrates well the curious tendency toward increase of red in plumage toward the Pacific Coast. In variety *nuchalis,* the nuchal band is red instead of brown, extending the chin red by so much; in specimens from Nevada, the scarlet area is still larger; and in the Coast form (*ruber*) the whole head, neck and breast are red, sometimes obliterating the normal pattern. This woodpecker is migratory, spending its summers and breeding only in the cooler parts of the United States and northward, and going South in midwinter. Its habits differ from those of other woodpeckers mainly in its custom of drilling a great number of holes in the bark of trees, to get at and eat the new wood and sugary sap lying beneath it. In many cases serious harm is done to fruit trees by the great number of chains of holes so bored, although many harmful insects are also devoured. See WOODPECKERS, and consult authorities cited thereunder.

SAPUCAIA (săp-oo-kīa) or **PARADISE NUTS,** the seeds of *Lacythis zabucayo,* or sometimes those of *L. ollaria,* belonging to the *Myrtaceæ* and closely allied to the Brazil nut. The trees, often 75 feet high, grow abundantly in the northern part of South America. The nuts which have a sweet almond-like flavor are more wholesome than Brazil nuts. They are about two inches long and an inch thick, with a corky shell furrowed lengthwise, and are found in hard urnshaped fruits, six inches across and with a woody wall half an inch thick. These curious, very hard capsules, have lids which fit closely, but fall off when quite ripe. Like the fruits of other members of the genus they are called monkey-pots, perhaps not only on account of their shape, but because monkeys are said to be very fond of the seeds, which are scarce for this reason. An edible and soap-making oil, which soon grows rancid, is expressed from sapucaia nuts.

SAPULPA, sa-pŭl'pa, Okla., city and Creek County seat, alt. 825 feet; on the St. Louis-San Francisco Railway, 102m. NE. of Oklahoma City. The Sapulpa Union Railway (electric) links the city with the Atchison, Topeka and Santa Fe Railroad at Tulsa. Oil and natural gas abound in the surrounding country, and the region is agriculturally rich. Glass is the principal

industrial product. There are glass, brick, and tile works. Sapulpa was founded in 1888, and incorporated in 1898. The name is from that of William Sapulpa, a Creek Indian, who established a trading post on the site in the early 1880's. Pop. (1940) 12,249; (1950) 13,031.

SARABAND, săr'ă-bănd, a dance said to be derived from the Saracens. Its character is grave and expressive. It originated in Spain, where it was formerly danced to the castanets. Leading composers frequently wrote tunes of this description for the harpsichord or clavichord. It became popular in Europe in the 16th century, but was prohibited for a time in Spain because of its indecency.

SARACENIC ARCHITECTURE. See MOHAMMEDAN ART.

SARACENS, săr'ă-sĕnz, a people mentioned by Ammianus Marcellinus (q.v.) as inhabiting the northern district of Arabia Felix. At the period of the Crusades the term was employed to designate all infidel nations, against which crusades were preached; and in course of time it became the generic name of all the Arabian tribes, who embraced Mohammedanism and extended their conquests in Asia and Africa.

SARAGOSSA, să-ră-gŏs'ă, or **ZARAGOZA** (ancient CAESAR-AUGUSTA), Spain, (1) capital of a province of its own name and of the ancient kingdom of Aragon, situated on the river Ebro, in a fertile plain, 174 miles northeast of Madrid. The see of an archbishop, it has two cathedrals, a university, a Moorish citadel, and many fortress-like palaces. Manufactures include cloth, silk, and porcelain. Saragossa was the Salduba of the Celtiberians, but the walls are all that remain of the ancient city. It renounced paganism at an early period and Aurelius Publius Clemens Prudentius (q.v.), the first Christian poet, was born here in 348 A.D. It suffered from various wars, and in 1808–1809 sustained two memorable sieges, costing 60,000 lives, but finally capitulated to the French. The part played in the latter siege by Augustina, the "Maid of Saragossa" (d. Ceuta, Spanish Morocco, 1857), was described by Lord (George Gordon) Byron (q.v.) in *Childe Harold.* Pop. (1944 est.) 266,483.

(2) The province of Saragossa contains 6,611 square miles. The highest elevation is 7,700 feet. On the northwest are the spurs of the Pyrenees. Pop. 617,356.

SARAH (Heb. princess), the daughter of Terah, half sister and wife of Abraham, who in her 90th year bore to him a son, Isaac, according to the promise of God. She died in Hebron at the age of 127 years. See ABRAHAM.

SARAJEVO, să'ră-yĕ-vô, Yugoslavia, capital of the Bosnia Herzegovina Republic created by the constitution of 1946, on the Miljacka River, 122 miles southwest of Belgrade (Beograd). Ruins of a 13th-century Hungarian castle crown a hill above the town. The town contains Roman Catholic and Greek Orthodox cathedrals, and numerous Mohammedan mosques. The assassination here of the Archduke Francis Ferdinand on June 28, 1914, precipitated World War I. Pop. (1948 est.) 118,158.

SARANAC LAKE, săr'ă-năk, village, New York, in Franklin and Essex counties, altitude 1,540 feet; on the Saranac River, near Lower Saranac Lake. It is served by the New York Central Railroad. It is noted as a health resort, and offers also year-round facilities for sports. In the summer the New York Giants football team trains here, and in the winter it houses the New York Rangers hockey team.

Here in 1894, Edward Livingston Trudeau established his outdoor sanatorium and laboratory for the study of tuberculosis. The Will Rogers Memorial Sanatorium was opened in 1930.

Manufactures include wood products and clothing. The region surrounding the village is agricultural. Settled in 1819, it was incorporated in 1892. The government is by city manager. Pop. (1950) 6,913.

SARASOTA, săr-ă-sō'tà, city, Florida, and Sarasota County seat, altitude 18 feet; on Sarasota Bay, an arm of the Gulf of Mexico. It is served by the Atlantic Coast Line and the Seaboard Air Line railroads; and has a municipal airport and seaplane base. The city is a shipping point for an area in which celery and citrus fruits are grown, and Brahman cattle are raised.

It is the winter quarters for the Ringling Brothers Barnum and Bailey Circus. It has a public library, a civic center, municipally owned Lido Beach and a municipal auditorium. The Ringling Museum of Art contains one of the country's finest collections of great paintings, including America's most outstanding collection of works by Peter Paul Rubens. The city has city-manager government. Pop. (1950) 18,896.

SARATOGA, Battles of, two battles of the American Revolution, called also the battles of Bemis' Heights, or of Stillwater, fought on ground about 12 miles east of Saratoga Springs and near the Hudson River. Both battles were fought under the same officers, the Americans being commanded by Horatio Gates (q.v.), who was ably served by Benedict Arnold and Daniel Morgan (qq.v.), and the British by John Burgoyne (q.v.). The first battle, Sept. 19, 1777, was indecisive. Burgoyne attacked Gates' army on Bemis' Heights, at Stillwater, about 4 P.M., and both sides claimed the victory in the ensuing engagement, which lasted until dark. The British loss was more than 500 men, while that of the Americans was under 400. The second battle, on Oct. 7, 1777, was the turning point in the American Revolution. Burgoyne launched another attack on the American position, but it was met by a counterattack which, after a sharp engagement, ended in the repulse of the British, who retreated 12 miles from Saratoga. There they entrenched themselves, but on October 17 Burgoyne surrendered to Gates with the honors of war. The troops surrendered numbered 5,791, and 42 field guns were taken. Congress refused to ratify the capitulation, which provided that the British should freely take passage for England on condition of not serving again against the Americans. As a result the captured British, with the exception of Burgoyne and a few other officers, were held as prisoners until the end of the war.

SARATOGA LAKE, a lake in Saratoga County in New York State, about four miles east of Saratoga Springs. It is a favorite place for

regattas; it has a straightaway course three miles long and is wide enough to accommodate eight racing sculls abreast.

SARATOGA SPRINGS (derived from the Indian word Saraghoga meaning "place of swift water"), N. Y., city and famous health resort in Saratoga County; altitude 330 feet; 25 miles northeast of Schenectady and 181 miles north of New York City; on the Delaware and Hudson Railroad. Saratoga Springs is situated at the foot of the southernmost spur of the Adirondack Mountains. Saratoga Lake (q.v.) is about four miles distant. Principal points of interest are the Casino, once the gambling house of Richard Canfield and now the headquarters of the Saratoga County Historical Society (the middle section has been made into a convention hall); the ancient cone of the High Rock Spring; the Avenue of Pines; Congress Park, with the Spencer Trask (q.v.) Memorial Fountain; the hotels; and the Saratoga Spa. It is the seat of Skidmore College (q.v.) for women. Near Saratoga is "Yaddo," the famous private estate of Spencer Trask, later providing hospitality for creative artists. The place was first settled in 1784, and Edgar Allan Poe (q.v.) visited it in 1843, during which time he is supposed to have written the first draft of *The Raven*.

The State of New York established a reservation about the chief mineral springs in 1909, and approximately 1,300 acres of land were subsequently included within it. Most of this land is in the High Rock, Lincoln, and Geyser parks, and upon this property are 83 natural springs and wells, including most of the naturally mineralized and naturally carbonated waters in the Saratoga region.

The French Catholic missionaries were the first known white men to visit this region. In 1684 the land now constituting Saratoga Springs and adjacent counties was ceded to the Dutch by the Indians. The first white owner of the now celebrated springs was Rip Van Dam; and Sir William Johnson (q.v.) was the first white man to test the efficacy of the waters when Mohawk Indians brought him here to bathe. The Indians called one of the springs "Medicine Spring of the Great Spirit," and warned away a white man who had built a cabin too close to the spring. In 1774 the first crude hotel was erected. Since 1826 the waters have been bottled and sent to various parts of the world. The Saratoga battlefield, the scene of the surrender of Gen. John Burgoyne to Gen. Horatio Gates, Oct. 17, 1777, is 12 miles east of the city. Gideon Putnam in 1802 built Union Hall near Congress Spring, the first large hotel at the Spa. In 1811 Congress Hall was erected, and in 1824 the first United States Hotel. Pop. (1950) 15,473.

SARATOV, sä-rä'tôf, USSR, capital of the Saratov Region, RSFSR, on the Volga, 459 miles southeast of Moscow. In addition to numerous oil and flour mills, leather, tobacco, textiles, and candle factories, machine and railroad shops, and shipyards, the city contains a university and several museums. Saratov was founded in 1605. Pop. (1939) 375,680.

SARAWAK, sä-rä'wäk, a British colony in Borneo (q.v.).

SARCEY, sår-sā', **Francisque**, French journalist and dramatic critic: b. Dourban, Oct. 8, 1828; d. Paris, May 15, 1899. After several years spent in general journalistic work he became dramatic critic for *Le Temps* (1867); in this position, which he held until his death, he was a dictator of dramatic criticism, his word being accepted as final by a large part of the public. He was the author of *The Word and the Thing* (1862); *Le Siège de Paris* (1871), which reached 30 editions in its first year; *Etienne Moret* (1875); *Comédiens et Comédiennes* (1878–1884); *Souvenirs de Jeunesse* (1884); *Company of Actors* (Introduction by Brander Matthews, New York, 1926).

SARCINA, sär'sĭ-nà, a genus of microscopic fungi, consisting of cubic or prismatic masses, made up generally of 8, 16 or 64 rounded, cubic cells, the faces of each cell being divided into four frustules or projections by two light grooves which cut each other at right angles. Each cell has a diameter of about $\frac{1}{100}$th to $\frac{1}{120}$th of a line, and consists either of a completely homogeneous mass only, without nucleus or granulations, or of such a mass with four, sometimes two or three nuclei. The cells are separated from each other by rectangular striae.

SARCINE or **HYPOXANTHINE**, $C_5H_4N_4O$, a weakly basic organic substance closely related to xanthine and to uric acid; found in the muscle juice and in many other fluids of the body. Consisting of colorless crystalline needles, slightly soluble in cold water, more so in hot, it unites with acids and certain metallic oxides to form compounds, many of which are crystalline.

SARCODINA, sär-kō-dī'nà, a class of unicellular organisms (protozoa) that are without an external membrane or cell wall. During the active, or vegetative, stage of existence they form pseudopodia, processes of the protoplasmic body substance by which locomotion is achieved and food material seized and taken in. For protection many of them construct a shell of lime, silica, or chitin, though a few cement together fragments of foreign material to form such a test. The common ameba, very similar in general structure to the white blood corpuscles, is usually regarded as a typical representative of the group. It illustrates the simplest forms, in that no skeleton or other specialized structures are present, although at certain times a temporary cyst wall is formed as a protection against cold or draft, or during spore formation. The character of the pseudopodia and of the shell are the main factors utilized in distinguishing the subdivisions of the class. Certain amebae are parasitic and are indistinguishable in general structure from the free-living species. They are, indeed, doubtless descended from slime-inhabiting forms which would require very little physiological modification to adapt themselves to parasitic existence in the intestine.

Most species exhibit under a high power a narrow marginal zone of clear material, the hyaline ectoplasm, which includes a more fluid granular endoplasm. The latter is in constant movement and contains food particles, non-contractile vacuoles, reserved materials, waste products, and one or more nuclei. The contractile vacuoles are located at the indefinite boundary line between the ecto- and endoplasm. They are, however, rarely found in parasitic species.

The parasites of amebic dysentery have been known since 1860 but the form known as *Endamœba coli,* which is believed by the majority of investigators to be harmless, has only recently been clearly differentiated from the pathogenic species *E. histolytica.* Both often occur together in the human intestine. While amebic dysentery is in general a disease of the tropics and subtropics the Mayo Clinic has tabulated within a short period over 500 cases which came from every northern State in the Union and from the Canadian Northwest. Infection in temperate regions is much less frequent than in the tropics where, as in the Philippines, e.g., careful reports show an infection of 37.5 per cent.

The free living Sarcodina fall chiefly in two orders. Among the most abundant of marine animals are the Rhizopoda whose calcareous shells also form large deposits in the rocks. The Radiolaria are equally abundant in the Pacific and connecting oceans as well as in fossil strata. These forms construct a skeleton of silica the form of which is characterized by sharp radiating spicules. The number and variety of these organisms is beyond conception. They form a considerable part of the bottom ooze found in the deep sea everywhere.

Other free living species are abundant in fresh water bodies and in fact occur in almost any moist environment. Recent discoveries have even disclosed the occurrence of enormous numbers of small amebæ in surface soils where they live in conjunction with various types of bacteria and are believed to play an important part in determining the fertility of the soil.

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SARCOMA. See TUMOR.

SARCOPHAGUS, originally the name given to a kind of stone that used to be quarried at Assos in the Troad, and which was employed for coffins or tombs: a coffin made of this stone was supposed to possess the property of consuming within a few weeks a dead body laid in it: in Greek *sarkophagos* means flesh-consuming, or flesh-devouring. Sarcophagus is now used only in the sense of coffin or tomb made of stone, or of terra-cotta or concrete as in the case of the highly ornate tombs which are found among the remains of ancient Etrurian art. Some of the sarcophagi found in Egypt are contemporary with the pyramids: the earliest are squared or oblong, the later ones, whether plain or ornamented with reliefs, have the same shape as the swathed mummies. Phœnician sarcophagi were modeled like the mummiform sarcophagi of Egypt, and were of marble or basalt; some of them showed the principal contours of the body. Before cremation of the dead came into general use at Rome, the illustrious dead were deposited in massive sarcophagi; celebrated among these is the tomb of the Scipios; under the empire Roman sarcophagi were very elaborately ornamented after the manner of the Etrurians. In modern times deceased men of great eminence or great wealth are sometimes laid away in stone chests or sarcophagi. Consult Morey, C. R., 'Sarcophagus of Claudia Antonia Sabina and the Asiatic Sarcophagi' (Princeton Univ. Press 1924); Fowler, 'Handbook of Greek Archaeology' (1909); Myres, 'Handbook of the Cesnola Collection' (New York 1914).

SARCOPSYLLA, a genus of parasitic fleas which bury their heads in the flesh of their hosts and create bad sores. The most noted species is *S. penetrans,* the chigo (q.v.). In our southern States and elsewhere another species, the chicken-flea (*S. gallinacea*), buries itself in the eyelids of domestic fowls.

SARCOSINE, methyl glycocoll, methyl glycine, $CH_3.NHCH_2.COOH$, a substance discovered by Liebig in the decomposition product of the creatine obtained from meat extract. Later made by the action of methyl-amine on monochlor-acetic acid. A colorless crystalline compound easily soluble in water.

SARD, a translucent, reddish-brown variety of chalcedony, extensively used as a ring-stone. See CORNELIAN.

SARDANAPALUS, sär-da-na-pā'lŭs (ASSURBANI-PAL) Assyrian king, ruled 668–625 B.C. He was the eldest son of Esarhaddon, grandson of Sennacherib, and great-grandson of Sargon. His father resigned the throne to him in 668 B.C., reserving only Babylon to himself. The following year the father's death left Sardanapalus sole ruler. Revolts being common upon a change of rulers, the attention of the new Assyrian king was called to the suppression of one in Egypt, where Tirhakah of Ethiopia had overthrown the system of princes tributary to Assyria. Tirhakah was driven southward out of Egypt after a disastrous battle, but his successor renewed the revolt and met with defeat. Thebes was robbed of an immense amount of treasures of art and wealth. Tyre also revolted, but after a prolonged blockade its king submitted. The kings of Arvad, Cilicia and Tabal were put in subjection, and Gyges of Lydia, who besought an alliance with Sardanapalus to aid him against his Cimmerian enemies from the Black Sea region, found he was accepted on terms which implied submission; and when later he assisted Psammetichus in throwing off the Assyrian yoke in Egypt he was destroyed by Sardanapalus. War broke out with Urtaku, king of Elam, who had made a raid upon Accad, ruled by the brother of the Assyrian king. It took a long struggle to complete the subjection of the country but it was accomplished finally during the reign of Teumman, Urtaku's usurping successor. After a great victory near Susa, Urtaku's sons were placed over the kingdom as Assyrian vassals. The decline of the empire began when the king's brother, Samas-sum-ukin (or Shamash-shum-ukin), ruler of Babylon, as vassal-king, instigated a revolt which was so widespreading as to include Elam, Arabia, Egypt, Chaldæa and other Asiatic countries. Egypt alone under Psammetichus secured her independence. Babylon was taken after a long siege and Samas-sum-ukin perished in the flames of his burning palace. Between 646-640 B.C. Elam was subjugated and Susa, after being pillaged, was razed to the ground. Sardanapalus celebrated his victories in Arabia by a triumphal procession through Nineveh.

Assurbanipal figures in classical literature under the name of Sardanapalus and there is described as a mere sensualist. Though cruel and implacable to foes, he was an enlightened despot, and literature and art, particularly architecture, flourished in his reign and attained

their highest degree of perfection. The king collected a famous library of all the known cuneiform tablets. The remains of his splendid palace with its priceless library were excavated at Kuyanjck. The tablets now belong to the British Museum, and form the basis of our present knowledge of the civilization and history of Assyria. Consult Oppert, 'Histoire des Empires de Chaldée et d'Assyrie'; Lenormant, 'Manual d'Histoire Ancienne de l'Orient' (1869); Rawlinson, 'Five Great Monarchies of the Eastern World' (1879); and the works cited of A. H. Sayce (q.v.).

SARDINES (sär'dēnz') **AND SARDINE FISHERIES.** The name sardine is a general one applied to various small fishes of the family *Clupeidæ* as well as, and less correctly, to the young of some of the larger species. «Thus, there are the Spanish sardine of the West Indies and Florida; the California sardine, found along the entire west coast of the United States; the Chile sardine; the oil sardine of India, and the sardines of Japan and New Zealand. But the sardine *par excellence* is the French sardine, so-called from the island of Sardinia, in the Mediterranean, about whose shores the fish are abundant.» The sardine or pilchard (*Clupea* or *Clupanodon pilchardus*) is usually about five or seven inches long, of an olive-green color above and silvery on the sides and below, with very large easily displaced scales, only about 30 of which form a complete longitudinal row. The usual French sardines are the yearling fish of what becomes, when full grown, the pilchard of English fishermen, attaining a length of 8 to 10 inches. Geographically it ranges throughout the Mediterranean; in the Atlantic from Madeira to Ireland and in the North and Baltic seas. They feed on minute crustaceans, larval forms and floating fish-eggs, the only kind of food for which their nearly toothless mouths are adapted. The pilchard spawns throughout the summer in the open sea, laying about 60,000 buoyant eggs. On the coast of Brittany, where the principal fisheries are located, sardines are now caught throughout the summer, and to a less extent at other seasons, exclusively by means of gill-nets of very fine twine and small mesh, which varies to suit the size of the run of fish. These nets are dyed blue, partly to preserve, partly to render them inconspicuous in the water; and the schools of fish are tolled into them by means of a bait made of the salted roes of various fishes, chiefly cod. The nets are operated from small two-masted boats which never go beyond a few miles from the shore. The catch is brought ashore and a portion is consumed fresh, but the bulk is sold to the canning factories.

The fishes, when bought for curing, are first beheaded and then gutted, and sorted according to size. They are then washed in sea-water and dried by being suspended on wire screens, nets or willows in the open air, and are then plunged into a cauldron of boiling olive-oil. For the cheaper grades peanut or cottonseed-oil is used. The sardines are laid in the cauldron on wire gratings, two rows deep, and are kept therein until sufficiently cooked, when they are taken out and allowed to drip, the oil-drippings being carefully collected. They are packed in the tin cases, which are filled with oil, and sealed hermetically. Throughout the process the greatest care is exercised to keep the fish in the best condition. The offal and waste of the sardine-curing industry is sold as manure to the farmers.

The sardine fishery is the most important fishery industry of France, employing before the war about 32,000 fishermen and more than 8,000 boats, and yielding an annual product of about 60,000,000 kilograms of sardines, valued at about 9,000,000 francs. At the last ante bellum enumeration about 15,000 persons were employed in the canning factories with an annual output of 4,000,000 or 5,000,000 boxes. The better grades are consumed in France, but the United States imports French sardines, chiefly of the cheaper grades. Sardines are also packed to a smaller extent elsewhere in Europe, especially in Spain and Portugal.

In the United States a true sardine (*C. cæruleus*) occurs on the coast of California, and the industry has developed from small beginnings to one of great importance, employing a large amount of capital, and many men. In the East the sardine industry of the United States centres about Eastport, Me., where the young of the herring is packed. These fish are caught chiefly in brush weirs (see POUND-NET FISHING) and are sold to the canneries, where they are treated in general after the French method with some local modifications. Drying rooms or ovens are employed in place of the open air; when ovens are used the fish are not boiled in oil, but are at once sealed; cottonseed-oil is almost universally employed instead of olive-oil; and various labor-saving devices have been introduced. The product is distinctly inferior to the best or even middlegrade French sardine. Judging from the results attained in the canning of the California sardine, this variety promises to rival the French product. The average annual output in Maine and California exceeds 1,700,000 cases in each State. The United States in 1935 exported 103,248,000 pounds of sardines, valued at $7,139,000, and imported about 25,000,000 pounds, valued at $3,600,000.

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SARDINIA, sär-dĭn'ĭ-ą, **Island of** (Italian, SARDEGNA), in the Mediterranean Sea, south of the island of Corsica, from which it is separated by the Strait of Bonifacio, not quite seven miles wide, extend between lat. 38° 50′ to 41° 15′ N., and long. 8° 5′ to 9° 50′ E. It is 152 miles long from Cape Teulada in the south to Longo Sardo in the north, and has a central breadth of about 66 miles. Its total area is 9,301 square miles divided into three provinces of the kingdom of Italy: Cagliaro (comprising the districts of Cagliari, Iglesias, Oristano and Lonusei); Sassari (comprising the districts of Alghero, Ozieri, Sassari and Tempio); and Nuoro, all named after the principal cities of the respective districts. The density of the population is 94.7 per square mile. Cagliari (q.v.) (pop. 94,902) is the capital. Before the consolidation of the Italian kingdom in 1861, Sardinia with its surrounding is-

Above: Washing clothes at a communal wash center in a poor quarter of Sassari.

SARDINIA

Below: Small farm house near Dorgali in east Sardinia. Raisins, produced from grapes, are drying in the sun at the end of the terrace.

Right: Using large wooden wheels boys weave cordage for their father's nets at the fishing village of Porto Torres.

(Above, below) Camera Press—Pix; (right) Three Lions

Left: Clad in the traditional costume of her native village this woman has come to Sassari for the annual *Cavalcata Sarda* pageant.

Above: Children clearing stones from a field.

Left center: Palm leaves being shredded at factory near Alghero, northwest Sardinia, for rope and mattress making.

Above: A man dressed in picturesque costume on Festival Day morning in Ploaghe.

Left: Workers in a salt marsh near Cagliari. One of the island's chief exports, salt is also an important source of government revenue.

Below: A street hawker from the mainland offers his merchandise in Cagliari.

(Top left) Ernest Rathneau-Pix; (left center) Camera Press-Pix; (others) Three Lions

lands, the principal of which are San Antioco, San Pietro, Asinara, Madalena, Tavolara and Caprera formed that part of the Sardinian states named the Kingdom of Sardinia. See SARDINIAN MONARCHY.

Topography.— The island is nearly in the form of a parallelogram. In a prehistoric age it was united with Corsica. The interior is generally mountainous, the great chain which traverses Corsica from north to south being evidently, notwithstanding the interruption of the Strait of Bonifacio, continued into Sardinia, where it usually follows the same direction, but occasionally sends out transverse branches east to west. The culminating point is the peak of Generagentu, situated a little to the east of the centre of the island, which attains the height of 6,132 feet. Between the mountain ridges are several extensive plains, of which the most celebrated for beauty and fertility are those of the Campidano in the south, and of Ozieri in the north. There are several large sandy or stony districts called *macchie,* of a very sterile nature. The streams are numerous, and add considerably to the fertility of the districts through which they pass, but are of no navigable importance. The Tirso, the largest, pours its waters into the Gulf of Oristano on the west coast. The lakes are situated chiefly in the vicinity of the coast, where they form a series of lagoons. Sardinia has a total coast line of 835 miles. The north coast is generally rugged and precipitous, presenting a succession of bold headlands. The principal bay is that of Porto Torres, in the Gulf of Asinara. The west coast is extremely diversified in character, rocky headlands (the principal of which is Cape Argentiera, 5,200 feet high), beaches, low hills, tablelands, open bays and bold islets succeeding each other. Guarding the strait of Bonifacio a group of fortified islands constitutes the naval station of Maddalena. Cape Teulada, nearly 900 feet high, forms the most southerly point of the island. Turning north from Cape Spartivento a number of rocky islets present themselves, lining a low and marshy beach, which continues almost unbroken. The Island of San Macario forms the southwest entrance of the Gulf of Cagliari. This gulf, besides having the capital situated on its northern shore, everywhere furnishes excellent anchorage in ample depth, and in the grounds along and behind it exhibits the best specimens of cultivation of which Sardinia can boast. The east coast, from Cape Carbonara northward, stretches nearly in a straight line, the continuity of which is seldom interrupted by indentations. The most conspicuous of all the headlands is that of Monte Santo, a rugged promontory upward of 2,400 feet high, sloping toward the sea, and terminating in bold precipices of limestone, within which is an extensive cave fantastically adorned with enormous milk-white stalactites.

Geology.— The greater part of the rocks are of crystalline texture and belong to the earliest formations, consisting of granite, overlain by gneiss and mica-schist. Trachyte, basalt and other rocks of volcanic formation are most largely developed in the Northwest, but also occupy a greater number of isolated spots throughout the island, and more especially in the southwest, where the adjacent islands of Saint Pietro and Saint Antioco are almost entirely composed of them. In many cases the mouths of ancient craters and the lava-streams issuing from them can be distinctly traced. Sedimentary Silurian rocks break the continuity of the granite on the east, and a large tract in the southwest belongs to the same formation, extending in a southwest direction till it reaches the southern extremity of the island and forms the remarkable promontory of Teulada. The limestones and chalks at the top of the secondary formation are not largely developed, but occupy a number of isolated tracts both in the interior and on the coast. In the latter portion they form conspicuous objects in the northwest, where the cliffs to the north of the Gulf of Alghero are composed of them, and in the east, where they form the great mass of Monte Santo and contain its celebrated stalactical cave. Tertiary rocks of travertine, marl and sandstone occupy a considerable tract near the town and along the Gulf of Sassari, and also in the south, where they form the eastern boundary of the plain of Campidano. That plain itself, however, has a deep covering of alluvium, which partly accounts for its remarkable fertility. Similar tracts of alluvium, though of much more limited extent, are found in the Plain of Ozieri in the north and along the Gulf of Palmas in the south and that of Paglia in the southwest.

Minerals.— The mineral riches of the island were well known to the ancients, whose extensive workings can still be traced. Tradition enumerates gold among its metals, but no traces of it can now be found. Lead, however, exists in considerable abundance, and is generally highly argentiferous. Mines of it are profusely scattered over various districts. Zinc ore (calamine) is worked, also lead ore; and both are exported. Copper occurs in several quarters and occasionally furnishes beautiful specimens of malachite. Quicksilver has been found and was once partially worked, and both bismuth and antimony are said to exist; iron of excellent quality is plentifully distributed and is worked in several districts. The other mineral products deserving of notice are porphyry, basalt, alabaster, marble, volcanic enamels, rock-crystals and a variety of beautiful pebbles, lignite, gypsum and nitre. Salt, in its mineral form, is found only in the grottoes of Serrenti, but is extensively obtained from the salt-pans along the coast, and forms one of the most profitable sources of royal revenue, for the sake of which it is strictly maintained as a government monopoly. There are about 12,000 engaged in mining, and the island takes fifth place in this industry among the Italian provinces.

Climate.— The climate of Sardinia has for many ages borne a very bad name; at certain seasons large districts become so insalubrious as to be regularly deserted by their inhabitants, while in others the mortality is remarkably great. The range of the thermometer is between 34° and 90° and the mean annual temperature 61° 7″. Hence neither heat nor cold can be said to be in excess. During the hot season, in the low-lying lands, miasmata are continually arising to taint the air, the malignant properties of which become so virulent at night or in the cool of the evening that the natives never quit their homes until an hour after sunrise and hasten to return before sunset, carefully closing every door and window. The disease which then prevails is

known by the name of *intemperie,* and is said to be even more fatal than the malaria by which parts of Italy and Sicily are infested.

Flora and Fauna.— The whole surface of Sardinia has been divided into three portions — one occupied by mountains, where not absolutely barren, is covered with forests or clothed with pasture; one occupied by marshes, lagoons and the almost sterile *macchie,* and one under tolerably regular culture, as arable land, olive-yard, vineyard, etc. See paragraph on *Agriculture.*

Game of all kinds is very abundant. Wild boars, stags, deer and mufflons frequent the woods and forests; and foxes, hares and rabbits are so numerous that their skins furnish a considerable article of export.

Fisheries.— From the extent of seacoast the fisheries naturally form an important branch of industry, which, however, is almost entirely in the hands of strangers. The most valuable fishery is that of the tunny, which is carried on extensively on various parts of the coast. Anchovies and sardines, the latter at one time so numerous as to have derived their name from the island, have become comparatively scarce. Fine mullet, bream, eels and other fish abound, and are staple articles of consumption and commerce. The coral fisheries, more celebrated in ancient than in modern times, are still carried on on the western and southern coasts. The *Pinna nobilis* also, the inhabitant of a shell of from 15 inches to 27 inches in length, abounds in the smooth water of shallow bays, as at Porto-Conte and Liscia, and is the object of an important fishery, partly on account of the pearls, generally of very indifferent quality, obtained from it, and still more on account of its byssus, or tuft of silky hair, which is about eight inches long, and is spun into gloves, stockings or other articles of dress.

Ethnology.— The inhabitants resemble the Spaniards rather than the Italians in character. Their demeanor is grave and dignified compared with the vivacity of the Italians, and they are characterized by their unwavering fidelity to their sovereign, their chivalric sense of honor and their hospitality. They suffered much, however, from long neglect and misgovernment, are ignorant and bigoted, and when they have received an injury are insatiable in their thirst for revenge, but the celebrated blood-feuds are now uncommon and brigandage has ceased. With the exception of the inhabitants of Cagliari and Sassari, the two chief towns of the island, the Sardinians have as yet been little influenced by the modern advances of civilization, and in some remote districts the traveler may imagine himself translated to a period several centuries earlier.

Agriculture.— Much of the land is of remarkable fertility but the system of agriculture pursued is imperfect. The Italian system of partnership or *colonia parziaria,* more especially in *mezzadria,* consisting in a form of partnership between the proprietor and the cultivator, is practised to some extent. The grain raised considerably exceeds the consumption of the present inhabitants, and might easily be increased so as to supply three times the number. The whole operations of the farm are conducted in an antiquated manner. The principal crop is wheat, which is generally of excellent quality, and forms an important article of export in the form not only of grain but of flour, biscuit and macaroni. The culture of barley is more limited and the quality of the produce is comparatively inferior; maize thrives well, and though not yet a general crop is rising rapidly into favor; beans and peas are extensively grown both for home consumption and export. Dairy farming flourishes, the island being second of the Italian provinces in cheese production. The vine is well adapted both to the climate and the soil. The produce, however, is more remarkable for its quantity than its quality, all the preparatory processes being conducted in a careless and imperfect manner. The most esteemed wines are those of the Campidano, Alghero, Sorso and Ogliastro. Beautiful and extensive olive-grounds are met with in various quarters, but the culture might easily be extended and made much more profitable than it has yet proved to be. The best oil is that of Sassari. The only other crops deserving of notice are tobacco, which is grown to some extent in several districts, but particularly around Sassari, Alghero and the adjacent villages; linseed, which is produced in the greatest abundance in the neighborhood of Oristano; cotton, for which the soil and climate of the Campidano appear well adapted; madder, which grows wild in many parts of the island, and, though neglected, might easily be cultivated to great advantage; and silk, well fitted to become a staple product, but at present produced chiefly for amusement.

Industries and Commerce.— Manufactures have made very little progress and are chiefly confined to a few coarse tissues woven by the women at their homes for private use. Tobacco and gunpowder — both, like salt, government monopolies — are manufactured to a considerable extent. Industrial establishments number 4,015, with 34,016 employees, utilizing 13,064 horse power, according to available statistics. The trade consists of the exports of raw produce, the greater part of which have already been enumerated, including corn, wine, brandy, timber, seeds, fish, cattle, lead ore, calamine, salt, tobacco, etc.; the imports include all the ordinary tissues, more especially cotton, colonial produce, hosiery, hardware and metals, hemp and cordage, etc. One great obstacle to the progress of trade was the miserable state of the roads, but good roads have now been made and railway lines constructed. The coinage, weights and measures are the same now as those on the mainland.

Language, Education, Religion, Government, etc.— The language consists of a number of dialects differing widely in many of their roots; several of them closely resemble Spanish. Over 73 per cent of the inhabitants are unable to read or write. There are two universities, one at Cagliari and the other at Sassari. The people are Roman Catholics. Sardinia now has a provincial government similar to the rest of Italy.

History.— The early history of the island is involved in much obscurity. Its prehistoric monuments of the Bronze Age (2000–1800 B.C.) are of considerable archæological interest. Its original inhabitants, according to Cicero of Libyo-Phœnician, and according to Strabo of Tyrrhene extraction, were living independent

when, about 530 B.C., they were attacked by the Carthaginians, and obliged, after a valiant but ineffectual resistance, to quit the low country and retire into their mountain fastnesses. During the first Punic War the Romans made strenuous exertions to become masters of the island, and ultimately, on agreeing to make peace, obtained a formal cession of it from the Carthaginians. This cession is mentioned by Livy as one of the causes which led to the second Punic War, in which Rome, though finally victorious, was brought to the brink of ruin by Hannibal. During the struggles between Rome and Carthage, Sardinia often became the theatre of war, and suffered equally from both the powerful states which contended for its possession. At a very early period the inhabitants were converted to Christianity. They passed successively into the hands of the Vandals, the Goths, the Longobards and Saracens. By the united efforts of the Genoese and Pisans the Saracens were ultimately expelled from the island, and then rival claims were set up for it by its liberators themselves. During the disputes that ensued some of the judges or governors succeeded in establishing themselves as independent princes. In 1297 Boniface VIII invested the kings of Aragon with Sardinia, and it continued in the possession of Spain till 1708, when it was taken possession of by the British. In 1713, in terms of the Peace of Utrecht, it was yielded to Austria. In 1720 it was ceded by Austria to Victor Amadeus II, Duke of Savoy, in exchange for Sicily. The Duke of Savoy thereafter assumed the title of king of Sardinia, which was finally exchanged in 1861 for that of king of Italy. Pop. 1,034,206.

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SARDINIAN MONARCHY, a former south European kingdom, comprising Sardinia (q.v.) and its surrounding islands as the nucleate portion with several dependencies on the Italian mainland, which included the duchy of Savoy, whence came its kings; the principality of Piedmont; the county of Nice; the duchy of Genoa and parts of the duchies of Montferrat and Milan. These latter were divided for administrative purposes into 11 divisions — Turin, Genoa, Chambéry, Alessandria, Coni, Novara, Nice, Annecy, Ivrea, Savona and Vercelli. Previous to the annexation of its territories consequent on the events of 1859 (see ITALY), and the disjunction from it of the duchy of Savoy and the county of Nice, which, in the same year, were ceded to and now form part of France, comprised in the whole an extent of 28,229 square miles, with a population in 1858 of 5,194,807. A new constitution was voluntarily granted by Charles Albert in 1848, under which two legislative chambers were introduced, freedom of the press conceded and important reforms carried through. Catholicism was the religion of the state, but all other forms were tolerated. The last Sardinian king was Victor Emmanuel II, afterward king of Italy, who succeeded to the throne in 1849. The royal title was King of Sardinia, Cyprus and Jerusalem, and Duke of Savoy. The crown-prince was styled Prince of Piedmont.

History.— The country which formed the Sardinian states was known in ancient times in its southern part by the name of Liguria, and in its northern part, bounded on the north by the Pennine and on the west by the Graian and Cottian Alps, by the name of Gallia Cisalpina. Savoy, separated from the other parts, and lying beyond the Alps, was considered as belonging to Gallia Narbonensis. From this remote corner of the territory sprang the present royal house of Italy. In the middle of the 11th century, Humbert, Count of Maurienne, a great vassal of Rudolf III of Burgundy, appears exercising jurisdiction not only over Maurienne, but various other parts of Savoy, the Lower Valais and Aosta. This jurisdiction was extended to the banks of the Po by Humbert's son, Otho, who died in 1060, leaving two sons, who became successively counts of Savoy. Under Amadeus III a long series of changes followed, during which the house of Savoy was sometimes brought to the verge of destruction, and at other times attained to such prosperity as to excite the jealousies or fears of neighboring states. One of the counts, called Peter, ruled from 1263 to 1268. He added the canton of Vaud to his dominions, and in many ways improved the fortunes of his house. Henry III of England, who had married his sister, made him Earl of Richmond, and gave him for residence a palace on the banks of the Thames, which hence took the name of Savoy House. Among Peter's successors the most distinguished are Amadeus V, whose prosperous rule, from 1284 to 1323, procured him the title of Great. Amadeus VIII at the termination of his long reign of 49 years, in 1440, left his successor in possession of territories which gave him a distinguished place among the sovereigns of Europe. Being, however, interposed between France and Germany, they were often made the battlefield on which these great countries met to decide their quarrels. Notwithstanding this disadvantage, the house of Savoy, at the Peace of the Pyrenees in 1659, by which the wars of the French and Spanish monarchies were terminated, after they had raged for nearly 80 years, found itself under Charles Emmanuel II as great and prosperous as ever. He was succeeded in 1675 by Victor Amadeus II, during whose reign war between France and Germany again broke out. Amadeus became almost necessarily involved, but played his part so ably, that at the Peace of Utrecht in 1713 he not only added considerably to his continental possessions but obtained possession and was formally crowned king of Sicily. By a subsequent arrangement he exchanged Sicily for the Island of Sardinia, from which he and his successors took the title of king. On his death in 1730 he was succeeded by Emmanuel III, who became involved in the war of the Spanish Succession and saw his territories laid waste by contending armies. The Peace of Aix-la-

Chapelle compensated him by the addition of several important districts, and his own enlightened administration added greatly to the prosperity of his kingdom. He was succeeded in 1773 by his son Victor Amadeus III, who was succeeded in 1796 by his son Charles Emmanuel IV, who, after seeing his continental dominions overrun by the armies of the French, took refuge in the Island of Sardinia in 1799, and in 1802 abdicated in favor of his brother Victor Emmanuel I, who remained in Sardinia until 1814, when he again fixed the seat of government at Turin. Shortly after, the Congress of Vienna added Genoa to his territories. An insurrection led to his abdication in 1821 in favor of his brother, Charles Felix, whose reign of 10 years was marked by some important internal improvements. Having left no male issue, a collateral branch succeeded in 1831 in the person of Charles Albert, who promulgated the liberal constitution of 1848, the provisions of which are referred to above. The same year saw him at the head of a league intended to expel the Austrians from Italy. The disastrous results led to his abdication in March 1849, in favor of his son, Victor Emmanuel II, and very probably to his death in the following July. Under the government of Victor Emmanuel the cause of progress and liberal institutions steadily advanced, some of the more important of the reforming measures being the establishment of universal toleration in religious matters, the suppression, with a few exceptions, of the monastic houses, and an unfettered freedom accorded to the press in the discussion of political matters. Such a development of liberal principles naturally proved extremely distasteful to Austria, whose arbitrary sway, exercised over the adjoining provinces of Lombardy and Venice, presented so marked and glaring a contrast. Frequent aggressive attempts were made by her, and pretexts sought for provoking hostilities with Sardinia; but the flame only burst out finally in 1859, when, in the month of April of that year, the Sardinian territories were invaded by an Austrian army. The war which then ensued ultimately issued in the establishment of the kingdom of Italy, into which the Sardinian states were incorporated, with the exception of the Duchy of Savoy and County of Nice, which King Victor Emmanuel ceded to France. See also ITALY—HISTORY.

SARDIS, sär'dĭs (ancient SARDES, sär'dēz), ancient city, capital of Lydia, Asia Minor; on the site of the modern village of Sart, Turkey, 35 miles east-northeast of İzmir (Smyrna). It stood in the valley of the Hermus (now the Gediz) River, below Mount Tmolus (now Boz Dağ). It was a wealthy trading center on the routes between the Aegean Sea and the interior. Its strong citadel was destroyed by the Cimmerians in the 7th century B.C., but the town recovered and flourished, becoming the luxurious capital of the proverbially rich Croesus (r. 560–546 B.C.).

In 546 it was captured by Cyrus, the Persian king, who incorporated Lydia into his realm. The acropolis was burned in 510 B.C. by the Greeks, and it was in Sardis that Xerxes prepared his invasion of Greece (480). The city was taken by Antiochus III after a siege (215–213 B.C.). Under the Romans, Sardis prospered in spite of great destruction by earthquake in 17 A.D., but after the establishment of Constantinople (330 A.D.), the trade routes gradually moved away from it. In 1306 it was ceded to the Seljuk Turks, and in 1402 it was taken by Tamerlane, who presumably destroyed it, since it disappears from history. Excavations have been conducted at intervals since 1910. The ancient burying ground is of vast extent, and there are the remains of the tomb of Alyattes (d. 560 B.C.), the father of Croesus, and of the Temple of Artemis, Ionic in style.

SARDONYX, sär'dŏ-nĭks, a variety of the mineral quartz, in which layers of sard, each of even thickness, alternate with layers of white chalcedony. It was prized by the ancients for cameos, intaglios, seal rings, and engraved gems.

SARDOU, sär-dōō', **Victorien,** French dramatist: b. Paris, France, Sept. 7, 1831; d. there, Nov. 8, 1908. He was for a time a tutor of philosophy, mathematics, and history, but soon began his literary career by writing for reviews and encyclopedias. His first play, *La taverne des étudiants* failed at the Odéon in 1854, and for a time he abandoned the theater. But before long he was dramatizing again, and he won a popular success in almost every field of the drama except tragedy. He was elected a member of the academy in 1877. His books include *Les pattes de mouche* (1860); *Nos intimes* (1861); *Les diables noirs* (1863); *Séraphine* (1868); *Rabagas* (1872); *Daniel Rochat* (1880); *Divorçons* (1880); *Odette* (1881); *Fédora* (1882); *La Tosca* (1887); *Cléopâtre,* with Émile Moreau (1890); *Thermidor* (1891); *Madame Sans-Gêne,* with Moreau (1893); *Gismonda* (1894); *Spiritisme* (1897); *Robespierre* (1899); *La sorcière* (1903).

In his comedy, Sardou revealed rapid movement, witty dialogue, frequently clever satire on contemporary matters, but unconvincing character portraiture, loose construction and improbable episodes. His "historical" dramas aimed at the heroic, but were simply grandiose.

SAREMA, sä'ryĭ-mä (German OESEL, û'zĕl), island, USSR, at the mouth of the Gulf of Riga, 13 miles off the Estonian coast. It is part of Saare Province of Estonia, and its chief town and port, Kuressare (Ger. Arensburg) on the southern coast, is the provincial capital. The island is 55 miles long and 25 miles wide, ending on the southwestern side in Sorve Peninsula, 20 miles long. The chief activities are dairy farming, the raising of hogs and sheep, the growing of potatoes and small grains, and fishing.

Sarema was conquered by the Teutonic Knights in 1227, and was governed by its own bishops until 1561, when it went to Denmark. The latter relinquished it to Sweden in 1645, and in 1721 it went to Russia as part of Livonia. Sarema became part of Estonia in 1918. During World War I, it was captured by the Germans in 1918, and was again occupied by them from 1941 to 1945 during World War II. Area 1,010 square miles. Pop. about 50,000.

SARGASSUM, sär-găs'ŭm, the most highly organized genus of the marine algae, Fucaceae, or rock weeds. They are seaweeds which are either attached to stones by a discoid hold-fast or are floating, with long filiform stems, much branched and bearing long, narrow, leaflike fronds with distinct midribs. The air bladders are little, stalked globes, with slender project-

ing tips, and stand out from the axils of the fronds, like solitary grapes. It is to this characteristic that the generic name remotely refers and which has given rise to the common names, tropical grapes and grape-weed. Sargasso stems are much employed in South America under the name of goitre-sticks, for the cure of goitre. *Sargassum bacciferum* is the famous gulf-weed, which forms rafts or islands floating together on vast areas of the various oceans and called «sargasso seas.» The one lying in the North Atlantic Ocean, between the Azores and the Antilles (roughly 20° to 38° north latitude and 30° to 65° west longitude), its exact position being determined by the central whirl of the Gulf Stream, is so dense as to be often a hindrance to navigation. It covers a territory nearly equal to the European continent and was discovered by Columbus on his first voyage, he and the succeeding Spanish navigators calling it the Mar de Sargaço; it is connected by a narrow belt with a smaller sea between the Bermudas and the Bahamas. There is still another sea in the Pacific and one in the Antarctic Ocean. It is a disputed question whether the weeds have been torn from the shore and blown to their final resting place or whether they live and propagate themselves on the high seas. At any rate these floating islands furnish a permanent home to many small pelagic animals and of predaceous animals seeking them as food.

SARGENT, Dudley Allen, American educator and lecturer: b. Belfast, Me., 28 Sept. 1849; d. Peterboro, N. H., 21 July 1924. In 1875 he was graduated at Bowdoin College and in 1878 received the degree of M.D. at Yale University. From 1879 he was director of the Hemenway Gymnasium at Harvard University and from 1879 to 1889 was assistant professor of physical training at Harvard. In 1881–1916 he was director of the Normal School of Physical Training at Cambridge, Mass., and after 1916 was president of its successor — the Sargent School for Physical Education. In 1907–16, Dr. Sargent was president of the Health Education League. He is the inventor of modern gymnasium apparatus, of the Sargent Anthropometric charts, and published 'Universal Tests for Strength, Speed and Endurance' (1902); 'Health, Strength and Power' (1904); 'Physical Education' (1906); also numerous articles and papers on physical education.

SARGENT, Epes, American poet and dramatist: b. Gloucester, Mass., 27 Sept. 1813; d. Boston, Mass., 31 Dec. 1880. He was educated at Harvard, was for a time connected with newspapers in Boston and New York, and in 1836 began writing for the stage. His plays include the 'Bride of Genoa'; 'Change makes Change'; 'Velasco,' and 'The Priestess.' He published 'Songs of the Sea' (1847); 'Poems' (1858); 'The Woman who Dared' (1869); his most noted lyric being 'A Life on the Ocean Wave.' His novels include 'Wealth and Worth' (1840); 'What's to be Done' (1841); 'Fleetwood' (1845); 'Peculiar: A Tale of the Great Transition' (1863). Still other works are 'Life of Henry Clay' (1843); 'American Adventure by Land and Sea' (1847); 'The Critic Criticised' (1856); 'Arctic Adventures by Sea and Land' (1857); 'Original Dialogues' (1861); and posthumously 'Cyclopædia of English and American Poetry' (1883).

SARGENT, Frank Pierce, American labor leader and government official: b. East Orange, Vt., 18 Nov. 1854; d. 1908. He was engaged in various occupations until 1880, when he became fireman on the Southern Pacific Railroad. He was chief of the Brotherhood of Locomotive Firemen in 1885–1902 and was prominent in the strikes of 1892–94. He gained the reputation of a forceful leader for the firemen, and at the same time was notable for his moderation and reasonable methods of dealing with employers. He was offered appointments as member of the Industrial Commission and as director of the Bureau of Printing and Engraving by President McKinley, but declined because of his desire to remain with the brotherhood. In 1902, however, he accepted President Roosevelt's appointment of him as Commissioner-General of Immigration, an office he occupied until his death.

SARGENT, Henry, American artist and soldier: b. Gloucester, Mass., 25 Nov. 1770; d. Boston, Mass., 21 Feb. 1845. He studied art in England in 1793–97. In 1799 he entered the United States army, was aide-de-camp to the governor of Massachusetts with rank as colonel in the War of 1812, and later adjutant-general. He served two terms in the legislature and afterward resumed his profession. His first painting was 'The Landing of the Pilgrims.' His other paintings include 'Christ Entering into Jerusalem'; 'The Starved Apothecary'; 'The Tailor's News'; 'The Dinner Party'; a full length portrait of Peter Faneuil, in Faneuil Hall, Boston, etc.

SARGENT, Herbert Howland, American soldier and military historian: b. Carlinville, Ill., 29 Sept. 1858. He was graduated at Blackburn University, 1878, and at the United States Military Academy in 1883. He was commissioned second lieutenant, Second Cavalry, 13 June 1883; first lieutenant, 19 June 1890; captain, 2 March 1899; major, 8 Jan. 1909. He served as professor of military science at the University of Illinois, 1886–87, and served on frontier. At the outbreak of the Spanish-American War he was ordered to Washington to help organize volunteer forces and was colonel of the Fifth United States Volunteer Infantry, 20 May 1898–31 May 1899. He served at Santiago and Guantánamo, Cuba, under Gen. Leonard Wood, and as lieutenant-colonel of the 29th United States Volunteer Infantry 5 July 1899 to 10 May 1901. He fought insurgents in the Philippines and commanded attacking forces 19 Dec. 1899 at the battle of San Mateo in which Major-General Lawton was killed. He was professor of military science and tactics at the Agricultural and Mechanical College of Texas, 1903–07, and graduated at the Army War College in 1909. He retired November 1911. On 27 June 1917 he was recalled to active duty, serving until 25 Sept. 1917, after which he was professor of military science and tactics at Princeton University. He published 'Napoleon Bonaparte's First Campaign' (1893); 'The Campaign of Marengo' (1897); 'The Campaign of Santiago de Cuba' (1907). He died, 16 Sept. 1921.

SARGENT, John Garibaldi, Attorney General of the United States: b. Ludlow, Vt., 13 Oct. 1860. After graduating from Tufts College in 1887 he studied law and was admitted to

the bar in 1890. He was State's Attorney for Windsor County, Vt., from 1898 to 1900, and from 1900 to 1902 was Secretary of Civil and Military Affairs of Vermont. He served as Attorney General of the State from 1908 to 1912, and from that year until 1925 was engaged in private practice in Vermont. In the latter year he was appointed by President Coolidge Attorney General of the United States, and served until 1929. He received honorary degrees from several universities and colleges, and served on important commissions. Died 5 March 1939.

SARGENT John Singer, American painter: b. Florence, Italy, 1856; d. London, England, 14 April 1925. He was educated in Italy, France and Germany, and received his early art training under Carolus Duran. He was elected member of the Royal Academy of England in 1891 and of the National Academy of Design, New York, in 1897. He lived abroad all his life and never spent more than a year in the country of his parents. Having had the advantage of being chosen by Carolus Duran as an assistant in the execution of important government commissions, he thoroughly mastered the secrets of French technique before adopting a method and style which are purely his own. His chief works are in portrait and genre. Among his portraits may be mentioned that of 'Carolus Duran'; 'General Leonard Wood'; 'Mr. Joseph Jefferson'; 'Major Francis Lee Higginson'; 'Homer St. Gaudens'; 'President Roosevelt'; 'Henry G. Marquand'; 'William M. Chase'; 'Carmencita'; 'Ada Rehan.' His genres include 'Fishing for Oysters at Cancale'; 'Neopolitan Children Bathing'; 'El Jaleo.' His most ambitious and original works, however, are the decorations in the Boston Library. As a painter his manner was French in brilliant versatility and epigram, but his treatment infinitely superior to the millinery effects of Duran and his school. His portraits reflect clearly the characteristics of his sitter and his intuition is unerring in detecting the subtilest traits of individuality. As a specimen of his wall-painting we may cite that portion of the Boston Library decorations known as the 'Dogma of the Redemption.' It is divided into an upper and a lower panel which would seem to represent Heaven and Earth severally. In the upper panel are the three persons of the Trinity enthroned, with hands raised in blessing, the Father wearing the triple crown, or tiara; each enrobed in a flowing, cope-like garment. In the centre of this picture is set up the cross on which Christ is suffering, while Adam and Eve catch in chalices of gold the blood that drips from his hands. Below the foot of the cross is the pelican, symbol of self-sacrificing love. Above the arms of the cross runs the inscription *Remissa sunt peccata mundi* ("The sins of the world have been remitted"). Across the molding which separates the two divisions of the subject is a monkish distich.

Factus homo factor hominis, factique redemptor,
Redimo, corporeus corpora, corda deus.
(I, man's maker, now made man, and redeemer of him I made, God in flesh, redeem all human hearts and bodies.)

In the lower panel are angels bearing the instruments of the passion, namely, the reed, the nails, the spear, the pillar of scourging and the scourge, the crown of thorns and the ladder. The work has all the pomp and dignity of Byzantine conventionalism, and for richness of color and splendor of arrangement is one of the most impressive of this magnificent series. It is deeply devotional in tone and must be looked upon as among the finest Christian painting of the period. In 1910 Sargent practically abandoned portraiture for landscapes and genre subjects. Among his later oil paintings are 'The Weavers' (1913); 'Cypresses and Pines' and 'The Courtyard' (1914). A notable exhibition of his water-color drawings was held in London and New York in 1912, from which the Boston Museum acquired 45 and the Brooklyn Museum 83 examples.

SARGENT, Winthrop, American soldier and Territorial governor: b. Gloucester, Mass., 1 May 1753; d. New Orleans, La., 3 June 1820. He was graduated at Harvard in 1771 and in 1775 entered the Revolutionary army, serving through the war and attaining rank of major. He was interested in the development of the West, became associated with the Ohio Land Company in 1786 and was soon afterward appointed surveyor-general of the Northwest Territory. In 1787 he became its secretary and in 1798–1801 he was governor of the Territory. He served in the Indian Wars of 1791 and 1794–95. He was a member of the American Academy of Arts and Sciences. Author of 'Papers Relating to Certain American Antiquities' (1796); 'Boston,' a poem (1803).

SARGENT, Winthrop, American lawyer and author, grandson of the preceding: b. Philadelphia, Pa., 23 Sept. 1825; d. Paris, France, 18 May 1870. He was graduated at the University of Pennsylvania in 1845 and at the Harvard Law School in 1847, practised law for a short time in Philadelphia and later settled in New York. He was well known in the periodical press as a writer on history and genealogy. Author of 'History of an Expedition against Fort Duquesne in 1775, under Major-General Braddock' (1855); 'The Loyalist Party of the Revolution' (1857); 'Life and Career of Major John André' (1861); 'Les États Confédérés et de l'esclavage' (1864), etc.

SARGON, sär'gŏn, a king of Assyria, successor of Shalmaneser, reigned from 722 to 705 B.C. See ASSYRIA.

SARK, särk, the "Pearl of the Channel Islands," situated seven miles east of Guernsey and 13 miles northwest of Jersey, is about three and one-half miles in length and one and one-half in extreme breadth. It is surrounded by inaccessible rocks, the chief landing-place, Creux (hole) Harbor, being on the east coast, where a cave has been enlarged and tunneled through the cliff to give access to the interior. The island consists of two portions, Great Sark and Little Sark, connected by a high and rocky isthmus, called the Coupée, narrowing to the width of only a few feet. On the west is the small islet of Brecqhou. Sark is annually visited by several thousand tourists owing to its interesting and picturesque scenery and numerous romantic caves. The inhabitants are chiefly engaged in fishing and agriculture. Sark is administered as a dependency of Guernsey.

SARMATIA, sär-mā'shĭ-a, a name given by the Romans to the country between the Vistula and the Caspian Sea and corresponding

largely to central and southern Russia. The Sarmatian people, of Aryan stock, were excellent horsemen and fierce warriors. By the 4th century A.D. they had been dispersed by pressure from the Romans, the Germans, and the Huns.

SARMIENTO, sär-myān'tō, **Domingo Faustino,** Argentine statesman and writer: b. San Juan, Argentina, Feb. 15, 1811; d. Asunción, Paraguay, Sept. 11, 1888. In 1829 he fought in the insurrection against the Gaucho dictator Juan Manuel Ortiz de Rosas and was exiled in 1835 to Chile, where he established a brilliant career as a literary figure, educator, and political thinker. His most famous book, *Facundo* (1845), ostensibly a biography of a political enemy, presents Sarmiento's enlightened and progressive political philosophy. In 1852, after Rosas' defeat, Sarmiento returned to Argentina and a political career. He was minister to the United States from 1864 to 1868 and president of Argentina from 1868 to 1874, giving the country one of its most successful and progressive administrations. From 1875 to 1888 he reorganized Argentina's school system. Sarmiento's extensive writings, largely devoted to educational theory, have appeared in a collected edition (52 vols., 1885–1903).

Consult Grummon, Stuart E., tr., *A Sarmiento Anthology* (Princeton 1948); Bunkley, Allison W., *The Life of Sarmiento* (Princeton 1952).

SARMIENTO DE GAMBOA, thä gämbō'ä, **Pedro,** Spanish mariner: b. Galicia, Spain, about 1530; d. there, about 1592. Long active on the Peruvian coast, he was ordered in 1579 to take possession of the Straits of Magellan for the purpose of intercepting Francis Drake, then engaged in his depredations off the coasts of Peru and Mexico. Drake, however, evaded him. In 1581 Sarmiento was sent again to fortify the Straits, holding joint command of the expedition with Diego Flores Valdés. Flores, however, deserted him, leaving him with only four vessels. In 1583 Sarmiento founded San Felipe (Port Famine), garrisoned it with 300 men, and in 1584 sailed for Europe. He was captured en route by the English and held prisoner until 1588. His colony lost all but two of its men by starvation. Sarmiento wrote a narrative of his voyages and a short history of the Incas, which have been translated into English.

SARNIA, sär'nĭ-ä, city, Ontario, Canada, seat of Lambton County on the St. Clair River a short distance below the point at which the river leaves Lake Huron, directly opposite Port Huron, Mich., and 170 miles west of Toronto. The city is connected with Port Huron by frequent ferry service, by the large Blue Water International Bridge, and by the famous St. Clair Tunnel (two and one-quarter miles long) of the Canadian National Railway. For over a century the port has played an important part in the transshipment of grain and lumber on the Great Lakes and as a steamboat passenger and freight terminal. The bay provides over three miles of still-water harbor frontage for vessels of up to 24-foot draft. There are large government warehouses and a Canadian National Railway grain elevator of three million bushels' capacity. In 1950 some 650 vessels arrived in the coasting trade and 530 in the foreign service. Unloadings from the latter were chiefly of coal and crude petroleum. Exports were chiefly of sand and gravel from the vicinity.

Sarnia has been notable in recent years for the rapid expansion of its industrial output. The Imperial Oil Company has erected the largest petroleum refinery in the British Commonwealth here and Dow Chemicals of Canada has also constructed large works. Other important manufactures include Fiberglas, steel and brass products, farm implements, synthetic rubber, salt, and flour. There is a large summer holiday trade with the nearby Lake Huron beaches. Pop. (1941) 18,734; (1951) 34,697.

SARONIC GULF, sä-rŏn'ĭk, or **GULF OF AEGINA,** ē-jī'nä, inlet of the Aegean Sea, 50 miles long and 30 miles wide, central Greece, separating Attica on the northeast from Peloponnesus on the southwest. It is connected by the Corinth Canal with the Gulf of Corinth. The main port is Piraeus, which serves adjacent Athens. Anciently the gulf was known as Sinus Saronicus.

SAROS, sā'rŏs, an astronomical cycle of 18 years, 11⅓ days, or 223 lunations, in which almost identical eclipses of the sun and moon are periodically repeated. The period of the saros is thought to have been calculated originally by the Chaldeans.

SAROYAN, sä-rō'yän, **William,** American author and playwright: b. Fresno, Calif., Aug. 31, 1908. Son of Armenian immigrants of the sort that he often pictures with affection in his work, he first gained recognition with his bitterly humorous *The Daring Young Man on the Flying Trapeze* (1934). This note, often autobiographical, continues in his numerous works. From 1939, when he produced his first play, *My Heart's in the Highlands,* he turned much of his energies into writing for the stage. His one popularly successful drama was the whimsical *The Time of Your Life* (1939), for which he was awarded, but declined, the Pulitzer Prize. This play was made into a film, as was his sentimental wartime novel, *The Human Comedy* (1942). Saroyan's recent publications include *The Bicycle Rider in Beverly Hills* (autobiographical, 1952) and *The Laughing Matter* (1953).

SARPEDON, sär-pē'dŏn, a hero in Homer's *Iliad,* slain by Patroclus in the siege of Troy. Greek mythology represents his grandfather of the same name as the son of Zeus and Europa and the founder of a kingdom in Lycia, Asia Minor.

SARPI, sär'pē, **Paolo** (called also Fra Paolo; Paulus Servita), Italian historian and statesman: b. Venice, Italy, Aug. 14, 1552; d. there, Jan. 15, 1623. Though he was a prominent member of the Servite Order, which he served as procurator general during 1585–1588, his intercourse with Protestant leaders brought upon him the imputation of heresy. In a dispute between Pope Paul V and Venice (1606) on the question of ecclesiastical authority Sarpi was a strenuous advocate of Venice and was summoned to Rome to answer for his conduct, but the affair was compromised. His ecclesiastical enemies attempted his assassination in 1607. Sarpi's chief literary work was his history of the Council of Trent, a work which now is accounted

untrustworthy on account of its extreme and evident partisanship. His labors extended to diverse branches of knowledge; he was skilled in the canon law, and was also distinguished for his acquaintance with anatomy. He appears to have discovered the valves of the veins which facilitate the circulation of the blood. His 'Istoria del Concilio Tridentino' was first published in London in 1619, having been transmitted to that country through the medium of the British resident at Venice, Sir Henry Wotton, a personal friend of the author. This work is strongly anti-papal, nay, even rationalistic in tone and was answered by a voluminous work on the same subject by the Jesuit Pallavicino. The works of Father Paul were printed at Verona 1761 (8 vols.) and at Naples 1790 (24 vols.). His life has been written in Italian by Bianchi-Giovini (1836), and in English by A. Robertson (1894). Consult also *Atlantic Monthly* (January and February 1904); Trollope, T. A., 'Paul the Pope and Paul the Friar' (1860).

SARRACENIA, sär-ą-sē'nĭ-ą, a genus of carnivorous plants, of about eight species, growing in bogs in eastern North America and named in honor of Dr. J. A. Sarracin. They have peculiar large nodding flowers solitary on their scapes. The five sepals are bracted at the base and the five fiddle-shaped petals are purple, brown or yellow and hang about a style which is dilated at the apex until it resembles an inverted umbrella, with five rays, terminating in hooked stigmas under the angles. The anthers are grouped about the base of the styles. The three- to five-celled ovary becomes a colored capsule in fruit. The name «side-saddle flower» has been given because of its resemblance to a pillion. The origin of the other vernacular names — pitcher plant, trumpet leaf or huntsman's horn — is very evident, for the leaves are hollow and with a lid more or less erect.

These leaves are dispersed in rosettes and are very curiously adapted, in the several species, for entrapping and digesting insects. The most common species is *Sarracenia purpurea,* which has tubular leaves, inflated at the middle and contracted at the orifice, where a heart-shaped wing, curved somewhat like a scoop, joins the hollow leaf. Another ribbon-like wing, starting from the base of the leaf, extends along the concave surface of the tube to the orifice. The whole pitcher-like leaf is green, veined with reddish purple. The scoop-like wing at the summit of the leaf catches rain-water and deflects it into the pitcher, which is often half-filled. The inside of the scoop is lined with glandular hairs which secrete honey, and the whole inner surface of the pitcher is lined with stiff spinous bristles, slippery and pointing downward, and the nearer the base the longer the points become. The reason for this apparatus appears when insects are attracted to the Sarracenia by the honey secreted in the hood-like wing. Some fly to it, some crawl up from the ground, helping themselves to climb by the longitudinal wing. Once there they feed on the honey, but if they carelessly stray from the wing to the orifice, where the slippery bristles begin, they promptly fall into the water collected in the pitcher. In spite of their struggles they can never crawl up past the relentless chevaux-de-frise of glassy, down-pointed teeth, and ultimately drown in the liquid. So many sometimes meet this tragic death that the putrid odor arising from the pitcher is offensive. Just what happens to the decaying bodies does not seem to be certain. Other carnivorous plants digest their victims with acid secretions and pepsin, and insects seem to be macerated in the *Sarracenia purpurea* pitchers more quickly than by ordinary rain-water, yet it is believed that the plants profit mainly by the liquid manure obtained. Consult Darwin, 'Insectivorous Plants' (new ed., New York 1900).

SARRAIL, Maurice, French general: b. 1856. In 1913 he commanded a division of the Sixth Army Corps at Rheims and at the opening of the war was sent to command at the Argonne. With Dubail he protected the French right flank against attacks from Thionville and Metz. He splendidly organized the defense of Verdun, holding it against the rush of the Germans in August and September 1914. Much of the strategy in the retreat to the Marne was given to his execution. About the middle of the year 1915 he was withdrawn from command but was appointed commander-in-chief of the Army of the Orient in August to succeed Gouraud. He made Saloniki, Greece, his headquarters and with his forces which were a mixture of troops of the most heterogeneous nature (British, Italian, Greek, African, etc.), he captured Monastir in December 1915. He was recalled December 1917. In 1918 he was placed on the reserve list. He wrote 'My Command in the Orient.' He died 23 March 1929.

SARSAPARILLA, an alterative drug obtained from the roots of a species of *Smilax,* indigenous to Central and South America. The drug-yielding species of this genus, to which the American cat-briers belong, are not very exactly identified, although sarsaparilla has been known to Europeans since 1536–45, and was extensively used soon afterward. *Smilax officinalis, S. medica* and *S. papyracea* are believed to be the principal sources of supply of sarsaparilla. They are tough, twining shrubs with square or round prickly stems, small flowers and generally shining leaves. Sarsaparilla plants were somewhat cultivated in Jamaica, but are chiefly obtained by trade with the aborigines of the countries where they grow. The drug itself is extracted from the horizontally creeping roots of the *Smilax,* which radiate from the stems, and are so long that it takes an Indian many hours to disentangle them from the soil and other roots. They are then dried and wrapped for transportation. The form of the original package in which the roots reach the pharmacist is an indication of the market from which it is sent, and the country from which it is exported furnishes the commercial name of the drug. Thus, Rio Negro, otherwise known as Para or Lisbon sarsaparilla, is always exported in cylindrical bundles, about three and one-half feet long and five or six inches in diameter, composed of finely wrinkled roots, brown with adhering earth, cut square and even at both ends, and wound closely with the stems of Pothos. Jamaica sarsaparilla (a name which formerly included many other varieties, now differentiated) is sent out loosely. Sarsaparillas are classed as mealy or non-mealy sarsaparillas, according to the amount of starch

granules in the parenchyma, a condition which seems to depend upon locality, and they differ in the color of their barks and in microscopical characters.

SARSFIELD, Patrick, Earl of Lucan, Irish Jacobite: b. Ireland, about 1645; d. Netherlands, Aug. 19, 1693. Commissioned colonel in 1686 he was a strong supporter of the cause of James II in Ireland, by whom he was created Earl of Lucan. He drove the English out of Sligo, fought at every important engagement of the war and had charge of the defense of Limerick. When that city capitulated in 1691, he crossed over to France where James gave him command of the Irish troops in the intended invasion of England the following year. He was mortally wounded at Neerwinden in the battle of Landen, Aug. 19, 1692.

SARSI, sär'sē, **INDIANS,** also Sarcee, Sarsee, Sussee, from a Blackfoot word said to signify "not good." Their own name is Sotemia. A tribe of the Montagnais division of the Athabascan stock of North American Indians, fewer than 200 survive in the Sarcee agency at Calgary, Canada.

SARTAIN, Emily, American artist: b. Philadelphia, March 17, 1841; d. there June 18, 1927. She was a daughter of John Sartain (q.v.), under whom she studied and worked at engraving, afterward studying (1864–70) at the Pennsylvania Academy of Fine Arts, then in Italy, and still later (1871–75), under Luminais, in Paris. She excelled in mezzotint engraving, in etching and in portrait painting; accomplished much in book illustration and the etching of framing prints, and in genre work also distinguished herself. She received a medal at the Centennial Exhibition in 1876, and the Mary Smith prize at the Pennsylvania Academy in 1881 and 1883.

SARTAIN, John, English-American engraver and editor: b. London, Oct. 24, 1808; d. Philadelphia, Oct. 25, 1897. He came to the United States in 1830, settled in Philadelphia and introduced in this country mezzotint, which he had begun two years earlier to practice. He also practiced miniature painting on vellum and ivory and portrait painting in oil. He was the designer of several public monuments, of which the best known is that to Washington and Lafayette in Philadelphia. He was also editor of the *Foreign Semi-monthly Magazine* and of the *Union Magazine,* which he renamed *Sartain's Union Magazine.* Among his more important engravings are *Christ Rejected* (1862), after Benjamin West; *The Ironworker and King Solomon* (1876), after Christian Schussele, and the *Battle of Gettysburg,* after Rothermel.

SARTAIN, William, American landscape, genre and portrait painter: b. Philadelphia, Nov. 21, 1843; d. New York, Oct. 25, 1924. After graduation from college he engraved for three or four years, then studied under Schussele and at the Pennsylvania Academy of Fine Arts. He then went to Paris and studied seven years under Bonnāt and at the École des Beaux Arts. He traveled in Spain, Italy and Algiers, and after exhibiting in London (1875) and New York Academy (1876) returned to America, settling in New York. He was one of the original founders of the Society of American Artists and was for some years professor of the life class of the Art Students' League, New York.

SARTO, Andrea Del, noted Italian painter: b. near Florence, July 6, 1486; d. Florence, Jan. 22, 1531. He was the son of a tailor (*sarto*). Authorities disagree as to whether Andrea's surname was Vanucchi or di Francesco; however, the nickname alluding to his father's trade by which he was known during his lifetime has been used ever since. In 1494 he was apprenticed to a goldsmith; disliking the craft, he soon changed his occupation, finding employment with Gian Barile, a skilled woodcarver but talentless painter. In 1498 the prentice boy again changed masters and, under Piero di Cosimo's direction, studied the cartoons of Michelangelo and da Vinci. Several years later he entered into a brief partnership with an older friend Franciabigio. Probably their first commission was a *Baptism of Christ,* in monochrome chiaroscuro, which initiated a series for the Florentine Compagnia dello Scalzo. In 1509 the Servite brotherhood employed him to paint five frescoes illustrating the life of their patron saint, Filippo Benizzi; these gained him his first renown and the title of *Andrea senza errori* (Andrew the unerring). Before the end of 1510, when Michelangelo's Sistine frescoes were still unfinished, the young artist was already regarded as rivaling Raphael. He continued working for the Servites until 1514, and on subsequent occasions executed individual commissions for them. In 1525 he painted for the cloister of their church of San Annunziata a lunette, the *Madonna del Sacco,* generally considered his masterpiece. Another famous fresco is the *Last Supper* in the church of S. Salvi near Florence. He stayed in Florence throughout the siege of 1529, but succumbed to the pestilence that followed, and was buried in the church of the Servites. Though his fame rests chiefly on his achievement as a fresco painter, his easel paintings (portraits as well as religious subjects) are valued by collectors and displayed in the principal American and European galleries. Vasari, who was one of his pupils, is the chief contemporary authority. Notices of him appear in all Italian art manuals, and there are biographies by American, English and Continental writers.

SARTO, Giuseppe. See Pius X.

SARTOR RESARTUS. Among autobiographies, *Sartor Resartus* ("the tailor patched") remains unique. It was built up out of Carlyle's thinking and his experience of life during his first happy married years at Craigenputtoch. It is a thickly veiled autobiography. Thomas Carlyle appears in a mask as Diogenes Teufelsdröchk, professor of things in general in the German university of Weissnichtwo. The second book deals with the advent, education, love affair and spiritual development of this remarkable professor. This is the most easily understood portion of the book and contains the most famous passages, such as the noble chapter, "Natural Supernaturalism." The first and third books profess to give translated excerpts from this imaginary professor's imaginary treatise on clothes, with comments and explanations by the "English editor." These

are Carlyle's radical opinions set forth, not in a complete system, but as fragments of a philosophy.

Most undeservedly *Sartor* has the reputation of being in prose what *Sordello* is in verse. The varied, impassioned, richly allusive style is supposed to be "German," and the matter to be beyond ordinary human comprehension. This widespread misconception is due to the fact that *Sartor* appeared at a time when "German" was a synonym for "mysterious." Carlyle learned his peculiar style in his father's house before he knew a word of German. There is difficulty in grasping Carlyle's unusual ideas, because they are unusual, not because they are presented feebly or obscurely. The narrative portions offer no difficulties. "It is a work of genius, dear," was Mrs. Carlyle's criticism; and the world has come to agree with this verdict.

The spiritual experience delineated in the second book is typical. Teufelsdröckh at the nameless university loses the simple creed of childhood and passes into doubt, denial, unbelief. He is in consequence utterly miserable. From this stage in his spiritual progress he passes, by way of the "Centre of Indifference" to "The Everlasting Yea," or positive working philosophy. The main ideas of renunciation, duty, work are derived from Goethe, whom Carlyle reverenced.

America welcomed *Sartor* before the writer's own country. Thanks to Emerson, an American publisher had the honor of producing the *editio princeps*. America also led in appreciation. The philosophy of *Sartor* had no little share in bringing on the Transcendental movement in New England. It exerted a great influence over Carlyle's contemporaries. Such leaders of thought as Emerson, Huxley, John Tyndall, John Ruskin and Charles Kingsley confess their debt. An edition of 30,000 copies sold before Carlyle's death. The first critical edition of the text with full notes and introduction by Archibald MacMechan appeared in 1896.

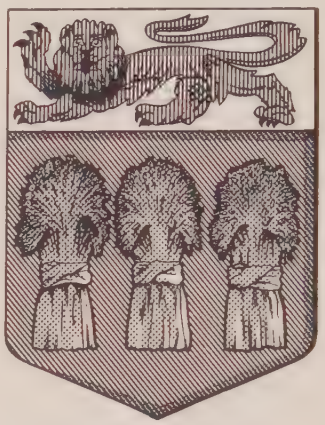
ARCHIBALD MACMECHAN.

SARTORIUS, sär-tō′rĭ-ŭs, the tailor's muscle (from the Latin *sartor,* a patcher, tailor), a muscle of the thigh which is attached at one end to the edge of the anterior, superior, spinous process of the ilium or chief bone of the pelvis, and at the other to the superior, anterior, and internal part of the tibia. It takes its name from the fact that it is by the contraction of the two sartorius muscles that the legs are crossed in sitting in the manner of tailors.

SARTS, a name given to the settled inhabitants, whether agriculturists or traders, as distinguished from the nomad inhabitants of Turkistan, Afghanistan, Iran, and the adjacent regions of Asia. Strictly speaking, the name has no ethnological significance.

SASEBO, sä-sĕ-bô, seaport, Japan, in Nagasaki Prefecture, Kyushu, near the mouth of Omura Bay. An important naval base since 1886, it was heavily bombed by United States forces in World War II. Pop. (1947) 175,233.

SASKATCHEWAN, săs-kăch′ĕ-wŏn, a Canadian province at the northern edge of the Great Plains region of North America, deriving its name from the river Saskatchewan (Cree Indian, meaning "swift flowing"), whose northern and southern branches unite within its borders. Bounded on the east by Manitoba, on the west by Alberta, on the north by the Northwest Territories, and on the south by North Dakota and Montana, Saskatchewan comprises an area of 251,700 square miles. Its northern and southern boundaries are 277 and 393 miles long respectively, and the distance between them is 761 miles. Less than half of the province is predominantly agricultural, but it is here that the capital (Regina) and the other cities (Saskatoon, Prince Albert, Moose Jaw, Swift Current, Weyburn, North Battleford, and Yorkton) are located. Wheat is the most important item in the economy; hence the unofficial title, "the wheat province."



Arms, Province of Saskatchewan.

For the convenience of readers this article is divided into the following sections:

Physical characteristics
Topography
Climate
Flora and Fauna
The People
Population and Ethnic Groups
Education
Cultural and Recreational Activities
Religion
Economic Development
Agriculture
Lumbering and Mining
Oil
Manufactures and Trade
Financial Factors
Transportation and Communications
Railroads, Airlines, and Highways
Telephones, Telegraphs, Radio, and Television
Newspapers
Parks and Places of Interest
Government
The Province
Local Government
Political Parties
History
Fur Trade Era
1905 to Present
Premiers
Bibliography

PHYSICAL CHARACTERISTICS

Topography.—Although large areas of Saskatchewan are comparatively level, altitudes vary from 697 feet at Lake Athabaska in the far north to 4,546 feet in the Cypress Hills in the extreme southwest. In general the province slopes eastward and to the north: the largest portion belongs to the Hudson Bay drainage basin, while in the northwest drainage is towards the Arctic Ocean; in a small area in the southwest the streams flow

SASKATCHEWAN: Winter brings snow to the broad central prairies of Saskatchewan near Saskatoon

National Film Board, Canada

The Saskatchewan Legislative Building at Regina.

SASKATCHEWAN

National Film Board, Canada

Aerial view of Saskatoon, showing Bessborough Hotel (center) and the South Saskatchewan River.

National Film Board, Canada

Lines of trees form windbreaks around farms near Riceton, southeast of Regina.

towards the Missouri. Saskatchewan contains large parts of the second and third prairie levels, separated by an escarpment known as the Missouri Coteau; the average altitude of the former is 1,600 feet, of the latter 2,000 to 2,500 feet. The chief rivers are the North and South Saskatchewan, the Churchill, the Qu'Appelle, and the Assiniboine, all part of the Hudson Bay drainage system. In the northern half of the province there are countless lakes, of which the largest are Athabaska (2,165 square miles in Saskatchewan), Reindeer (2,444), Wollaston (768), la Ronge (450), Cree (350), and Peter Pond (302). About one third of Saskatchewan lies within the pre-Cambrian shield region, a land of rock, water, and stunted forest, with tundra in the far northeast corner. South of this is a wide belt of mixed forest, which in turn gives way to another belt of tall grass and poplar groves (park land); south of this again and extending to the international boundary is the grass-covered open plain. The glaciers left their mark throughout the province by scouring the pre-Cambrian rocks and leaving thick deposits over the Cretaceous sandstones of the southern half. The heavy, level clay lands of the Regina and Rosetown districts mark the location of large glacial lakes. A significant geological feature of the southern border area are the deposits of the Tertiary period containing lignite coal formations. The top soils lie in broad belts running diagonally northwest across the southern half of the province and ranging from light brown, through dark brown, black, and grey in the forest belt.

Climate.—The climate of Saskatchewan is continental in type, with marked variations between summer and winter and day and night temperatures. In the far north the July average is 58°F. and in the south 65°F. The January averages are —18°F. and —1°F. respectively. The frost-free period in the southern half of the province varies from 110 to 125 days. Rainfall ranges from 11 to 15 inches in the open plains, and tends to be irregular; the park land and forest belt receive 15 inches or more, and with greater regularity. Farther north precipitation decreases, but there is less evaporation.

Flora and Fauna.—Travelers of the pre-settlement era make frequent reference to the flowers which carpeted the open plains in the summer, but much of the original grassland vegetation has disappeared with the spread of cultivation; on the other hand the virtual elimination of prairie fires has favored the spread of poplar, willow, and alder "bluffs" in park land areas. The forest species are those common to all northern Canada, but are less numerous than in eastern Canada, especially the deciduous varieties. Spruce, jack pine, balsam, tamarack, birch, and poplar are present in significant quantities. The tundra of the extreme northeast is largely treeless, but abounds in arctic grasses, shrubs, mosses, and lichens.

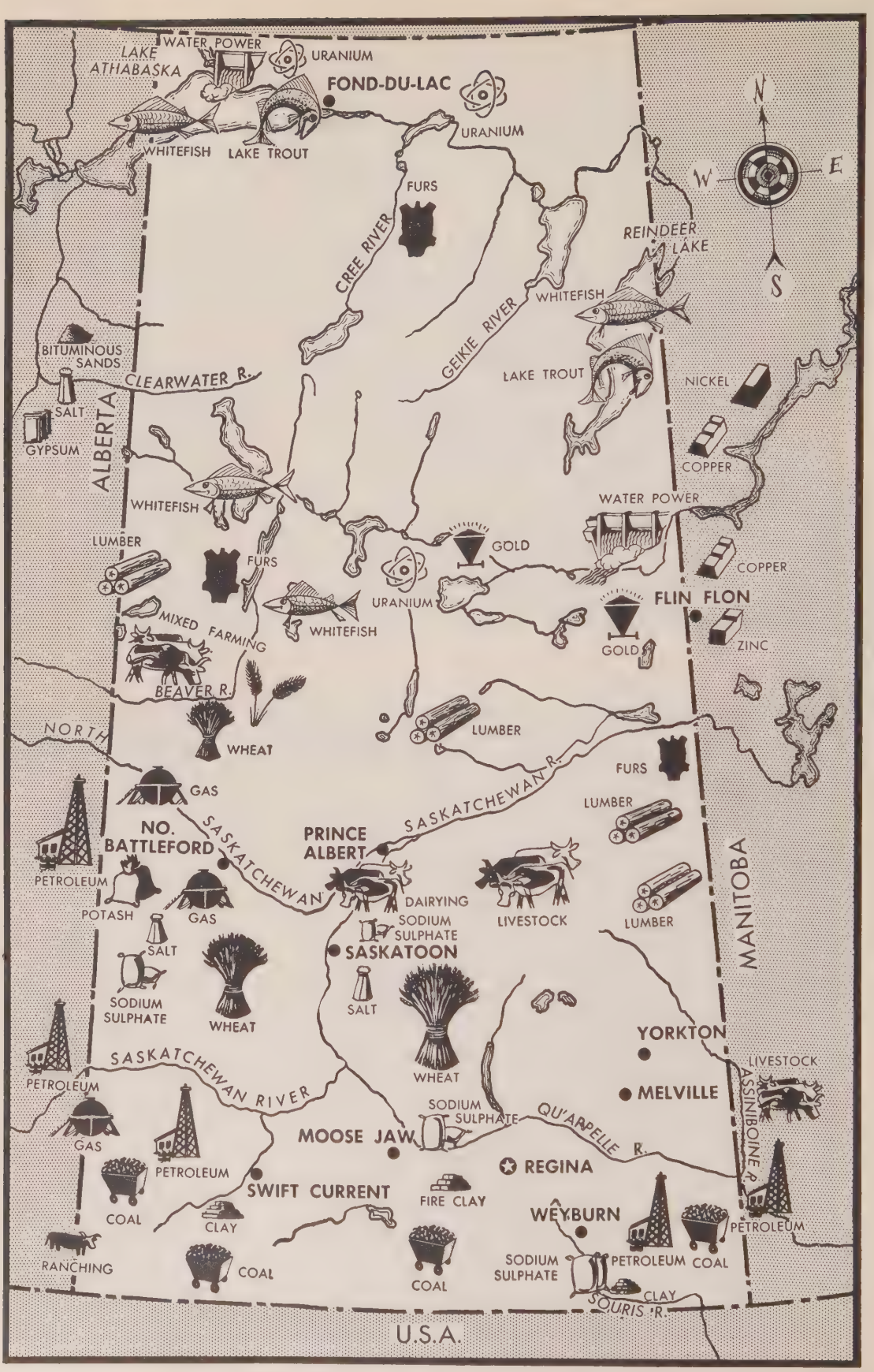
The province has rich and varied wild life resources. Buffalo now exist only in parks, but other big game animals—deer, antelope, elk, moose, and caribou—are flourishing as a result of conservation measures. Beaver and muskrat trapping is carefully controlled, and these fur bearers have increased greatly. Other animals of the province include the rabbit, gopher, coyote, weasel, mink, fox, squirrel, black bear, skunk, and lynx. For commercial and sporting purposes the most important fish are whitefish, trout, pickerel, pike, tullibee, mullets, and sturgeon. Game birds (especially waterfowl) are in bounteous supply throughout the province, and include ducks (in many varieties), Canada geese, prairie chicken, Hungarian partridge, pheasants, and ruffed grouse.

THE PEOPLE

Population and Ethnic Groups.—The population of Saskatchewan in 1953 was estimated to be 861,000 (1951 census, 831,728). The peak was reached in 1936 (931,547), followed by more than a decade of decline due to the effects of depression, war, and employment opportunities in more industrialized areas. Economic developments of recent years have reversed this downward trend, and there has also been a marked increase in urban population, while the farm population has declined sharply due to the increasing size of farm units. The rural population (farm residents and villages under 1,000) is still the dominant factor: 579,258 in 1951. Saskatchewan's population is unique in that it has the lowest percentage of persons of Anglo-Saxon origin (42 per cent) of any province except Quebec. German, Slavic, and Scandinavian elements account for 39 per cent, and French 6 per cent. There are 22,000 Indians, living mostly on reserves.

Education.—There has been an intense interest in public education in Saskatchewan from territorial times to the present day. Government support for voluntarily organized schools began in 1880 and the first tax supported schools appeared in 1884. Beginning with a system similar to Quebec's, the form of organization was gradually modified so that by 1905 educational affairs were controlled by a single government department with common curriculum, supervision, and teacher certification; at the same time provision was made for government grants and local tax support for elementary schools organized to serve the Protestant or Roman Catholic minority in any locality. Since 1944 over 50 larger units of school administration have been organized, providing a better financial base to support the continuous pressure for improved educational service. The provincial government gives grants to school districts, supports two teacher training colleges, encourages school libraries and music, and promotes the use of radio and visual aids. The University of Saskatchewan at Saskatoon, chartered in 1907 and supported by student fees and government grants, is the only institution (except theological colleges) empowered to grant degrees. It has attained a high reputation in the natural and applied sciences, and for many years has provided important adult education services.

Cultural and Recreational Activities.—There has been a widespread interest in music from pioneer times to the present, and there are annual musical festivals in the larger centers. Despite limited patronage, some distinguished work has been produced by Saskatchewan painters and writers. The Saskatchewan Arts Board, established by the provincial government in 1948, encourages creative activity in literature, drama, the visual arts, handicraft, and music. The Saskatchewan Archives Board, established in 1945, provides facilities for historical research and publishes an historical journal. There are libraries in all the larger towns and one regional library with headquarters at Prince Albert; for rural residents the government provides traveling libraries and a central reference library.



Saskatchewan: Principal resources and products.

SASKATCHEWAN

Above: Buildings of the University of Saskatchewan at Saskatoon. *Right:* Like sentinels, grain elevators dot the prairie landscape.

(Above) Courtesy National Film Board of Canada; (right) © T. R. Melville-Ness

Left: A patient from a rural area is transferred to a city ambulance at Regina Airport. *Below:* A glimpse of the beautiful Qu'Appelle Valley, northeast of Regina.

Courtesy National Film Board of Canada

SASKATCHEWAN

Above: Virgin forests and tranquil, sandy-beached lakes like Loon Lake make northern Saskatchewan a popular vacation area.

Left: A crew of workmen tackle the job of digging out a locomotive after one of the province's heavy snowfalls.

Right: Winters in Saskatchewan can be cold and rough. Here a farmer heads homeward on his horse-drawn sled, warmly clothed against the stinging winds and the 40° below zero weather.

Below: As if to compensate for the cold, the bare trees are clothed with a beautiful white mantle of frost.

(Top and right) Cliff Shaw; (others) L. H. Shaw

SASKATCHEWAN

1951 Total Population 831,728

Abbey (C5) 254
Aberdeen (E3) 271
Abernethy (H5) 314
Abound (F5) 30
Adanac (B3) 48
Admiral (C6) 146
Alameda (J6) 286
Albertown (D3) 5
Albertville (F2) 35
Alida (K6) 106
Allan (E4) 332
Allan (hills) (E4) .....
Alsask (B4) 209
Alticane (D3) 75
Alvena (E3) 191
Amisk (lake) (M4) .....
Amulet (G6) 68
Anerley (D4) 44
Aneroid (D6) 283
Anglia (C4) 110
Antelope (C5) 150
Antelope (lake) (C5) .....
Antler (K6) 132
Antler (riv.) (K6) .....
Arborfield (H2) 520
Archerwill (H3) 275
Archydal (F5) .....
Arcola (J6) 614
Ardath (D4) 76
Ardill (F6) 38
Arm (riv.) (F5) .....
Armit (K3) 10
Armley (G2) 112
Arran (K4) 223
Artland (B3) 55
Ashley (B2) .....
Asquith (D3) 255
Assiniboia (E6) 1,938
Assiniboine (riv.) (J3) .....
Athabaska (lake) (L2) .....
Atwater (J5) 86
Avonhurst (G5) 20
Avonlea (G5) 307
Aylesbury (F5) 127
Aylsham (H2) 402
B-Say-Tah (G5) 25
Bad (lake) (C4) .....
Balcarres (H5) 501
Baldwinton (B3) 155
Balgonie (G5) 146
Bangor (J5) 134
Bankend (H4) 50
Bannock (H3) 15
Bapaume (D2) 20
Barford (H3) 15
Basin (lake) (F3) .....
Bateman (E5) 137
Batoche (E3) 200
Battle (creek) (B6) .....
Battle (riv.) (B3) .....
Battleford (C3) 1,319
Battrum (C5) 25
Bay Trail (F3) 10
Beadle (B4) 75
Bear (hills) (C4) .....
Bear Creek (K5) 5
Beatty (G3) 142
Beaufield (C4) 5
Beaver (hills) (H4) .....
Beaver (riv.) (L4) .....
Beechy (D5) 227
Belle Plaine (F5) 82
Bender (J5) 45
Bengough (F6) 396
Benson (J6) 145
Bents (D4) .....
Bertwell (J3) 20
Bestville (C5) .....
Bethune (F5) 236
Beverley Sta. (C5) 68
Bienfait (J6) 794
Big Beaver (F6) 100
Big Muddy (lake) (G6) .....
Big River (D2) 901
Biggar (C3) 2,214
Bigstick (lake) (B5) .....
Birch (lake) (C2) .....
Birch Hills (F3) 475
Birkensee (C2) .....
Birmingham (H5) 36
Birsay (D4) 126
Bishopric (F5) 120
Bitter (lake) (B5) .....
Bjorkdale (H3) 100
Black (lake) (M2) .....
Bladworth (E4) 138
Blaine Lake (D3) 484
Blucher (E3) 63
Blumenhof (D5) 125
Bodmin (D2) 151
Boharm (F5) 50
Borden (D3) 194
Bounty (D4) 90
Bournemouth (C2) 15
Bracken (C6) 99
Bradwell (E4) 119
Brancepeth (F2) 112
Bratton (D4) 25
Bredenbury (K5) 404
Bremen (F3) 5
Bresaylor (C3) 50
Briarlea (F2) .....
Bridgeford (E5) 40
Briercrest (F5) 171
Brightsand (lake) (B2) .....
Broadacres (B3) 33
Broadview (J5) 883
Brock (C4) 191
Brockington (G2) .....
Broderick (E4) 114
Bromhead (H6) 124
Bronson (lake) (B2) .....
Brooking (G6) 118
Brooksby (G2) 212
Browning (J6) 66
Brownlee (F5) 131
Bruno (F3) 542
Bryant (H6) 75
Buchanan (J4) 538
Buffalo Gap (F6) 77
Bulyea (G5) 180
Burr (F3) 15
Burstall (B5) 214
Buzzard (B2) 20
Cabri (C5) 466
Cabri (lake) (B4) .....
Cactus Lake (B3) 20
Cadillac (D6) 236
Calder (K4) 296
Cana (J5) 25
Candiac Sta. (H5) 99
Candle (lake) (F2) .....
Cando (C3) 150
Canoe (lake) (L3) .....
Canora (J4) 1,568
Cantuar (D5) 64
Canuck (C6) .....
Canwood (E2) 272
Carievale (K6) 260
Carlton (E3) 100
Carlyle (J6) 716
Carmel Station (F3) 133
Carmichael (C5) 71
Carnduff (K6) 600
Caron (F5) 126
Carpenter (F3) 5
Carragana (J3) 233
Carrot (riv.) (J2) .....
Carrot River (H2) 801
Carruthers (B3) 95
Cavell (C3) 36
Cedoux (H6) 86
Central Butte (E5) 280
Ceylon Station (G6) 324
Chamberlain (F5) 136
Chaplin (E5) 374
Chaplin (lake) (E5) .....
Chelan (H3) 152
Cheviot (E3) 33
Chipman (riv.) (M2) .....
Chitek (lake) (D2) .....
Choiceland (G2) 435
Christopher Lake (F2) 75
Churchbridge (J5) 264
Churchill (riv.) (M3) .....
Clair (G3) 150
Clarkboro (E3) 10
Clashmoor (H3) 20
Clavet (E4) 52
Claydon (B6) 112
Clearwater (riv.) (L3) .....
Cleeves (C2) 62
Cliftonville (B5) 15
Climax (C6) 293
Cloan (C3) 20
Cochin (C2) 50
Cochrane (riv.) (N2) .....
Coderre (E5) 201
Codette (H2) 165
Coleville (B4) 100
Colfax (H6) 77
Colgate (H6) 83
Colonsay (F3) 228
Congress (E6) 89
Conquest (D4) 260
Consul (B6) 105
Cookson (E2) 42
Coppen (E6) 50
Corinne (G5) 53
Corning (J6) 122
Coronach (F6) 300
Coteau, The (hills) (D4) .....
Court (B4) 15
Courval (E5) 100
Cowan (lake) (D2) .....
Craik (F4) 549
Crane (lake) (B5) .....
Crane Valley (F6) 89
Craven (G5) 153
Crean (lake) (E1) .....
Cree (lake) (L3) .....
Cree (riv.) (M2) .....
Creelman (H6) 150
Crestwynd (F5) 55
Crooked River (H3) 175
Crystal Springs (F3) 150
Cudworth (F3) 559
Cumberland (lake) (J1) .....
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SASKATCHEWAN

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Sport has been an important factor in community life since the 1880's. Curling bonspiels are the largest in Canada, and golf and fishing have many devotees. There is intense and widespread interest in baseball, football, and hockey, which are organized in both professional and amateur leagues.

Religion.—Beginning with missions to the Indians in the 1840's, the church in Saskatchewan advanced with the westward moving agricultural frontier, supported by parent bodies in eastern Canada, Great Britain, and (latterly) the United States. As a center of community life and as a social influence, the church has played a vital part in the history of the province, and during the 1930's many church leaders exercised considerable influence in movements for political and economic reform. The 1951 census shows the largest denominations to be United Church of Canada (247,000), Roman Catholic (199,000), Anglican (95,000), Lutheran (91,000), Greek Catholic (37,000), Ukrainian Greek Catholic (37,000), Greek Orthodox (34,000), Presbyterian (33,000), and Mennonite (26,000).

ECONOMIC DEVELOPMENT

Agriculture.—Agriculture is and will remain the most important element in the provincial economy despite the recent discovery and development of nonagricultural resources. Total farm land in the province amounts to approximately 62 million acres out of a total land area of 152 million; of this, some 38 million acres are under cultivation. Saskatchewan ranks second in Canada and almost equal to Ontario in farm cash income from the sale of agricultural products. Farm implement sales are the highest in Canada, and in 1951 were 26 per cent of the national total. Saskatchewan is the major producer of wheat, oats, and rye, and ranks next to Alberta in barley and to Manitoba in flax according to 1952 statistics. In livestock marketings the province ranks third in cattle, fourth in hogs, sheep and lambs, and fifth in calves. Farm cash income in 1952 for field crops was $581,346,000 and from livestock and poultry $22,044,000.

Lumbering and Mining.—Major forest formations cover 45 per cent of the province, but production has been confined to areas accessible by rail and highway. The total value of forest products in the fiscal year 1952–1953 was $8,785,000.

Mineral production in 1952 was worth $49,500,000, the most important products being the metals of the pre-Cambrian shield area—copper, zinc, and gold—which represent 77 per cent of the total production value. The province ranks third in Canada as a producer of zinc and copper. It is the only province producing sodium sulphate. In 1952 it ranked third as a producer of salt and of coal (in tonnage), though the latter is lignite and reduces the province to fifth place in terms of its value (1952, $4,000,000). Saskatchewan has recently become a major producer of uranium, the most important activity being concentrated north of Lake Athabaska; there is intensive uranium prospecting activity throughout the Pre-Cambrian shield area.

Oil.—Saskatchewan ranks next to Alberta in the production of oil. The oil boom began in 1950 when 124 wells were drilled; in 1953, 674 were drilled and 3,000,000 barrels produced, valued at $4,300,000. Heavy crude oil has been found in considerable quantity, and there are also several medium and light oil areas. Extensive refinery expansion has followed the oil finds, which have also led to the discovery of large reserves of natural gas in the area between the north and south branches of the Saskatchewan river. Commercial and domestic use of natural gas began in 1953.

Manufactures and Trade.—In 1950 there were 10,596 persons engaged in manufactures in Saskatchewan who produced products with a net value of $49,494,641. There is less manufacturing than in the other two prairie provinces, the main activity being in the fields of flour milling, brewing, butter and cheese, meat packing, printing and publishing, and petroleum products.

Commerce has been the chief support of Saskatchewan's urban centers, from the hamlet with its railway siding, grain elevator, general store, and garage, to the city with its wholesale establishments, financial houses, and varied retail services. The country general store, the chain store, the co-op store, and mail order houses, are all important elements in the merchandising field. Retail sales in 1951 amounted to $654 million, of which $79.2 million was by chain stores and $39.9 million by cooperative purchasing associations. Though consumer cooperatives are not a dominant factor in retail trade they have made rapid progress since 1930, and in 1952 they had a membership of 133,000; their share of total retail sales arose from 2.1 per cent in 1935 to 6.5 per cent in 1952.

Commercial prosperity is closely related to farm income, and the marketing of farm products has always been a matter of vital concern to all classes in the province. In the period since World War I cooperative marketing organizations have developed on a large scale, and today they handle nearly two-thirds of the dairy products and more than half the grain, seed, and poultry; a little less than half the eggs and about one third of the livestock is marketed cooperatively. The largest of the marketing cooperatives is the Saskatchewan Wheat Pool, with a membership of over 139,000, owning 1,141 country elevators.

Financial Factors.—The rapid development of the provincial economy in the period of agricultural settlement was based on large amounts of credit from outside sources in the form of farm loans, urban real estate investments, and municipal and provincial government borrowings. Current farm operations were generally financed by banks and retailers. During the depression of the 1930's debt charges assumed serious proportions in the general economic and financial dislocation. The postwar period, however, has been one of rapid recovery and expansion, marked by sharp reductions in farm and municipal debt and in dead weight provincial government debt. At the same time public and private investment in productive enterprises has been increasing, and totaled $2,100 million for the period 1948–1953. In 1953, 346 new companies were incorporated and 253 extraprovincial companies were registered. Provincial government revenues have been buoyant, permitting a general expansion and improvement in public services.

TRANSPORTATION AND COMMUNICATION

Railroads, Airlines, and Highways.—With its hundreds of small communities scattered over a vast area, Saskatchewan has 15 per cent of Canada's total rail mileage; two transcontinental

lines cross the province, and almost every community in the agricultural area is situated on a railway. Trans-Canada Airlines and Canadian Pacific Airlines operate flights from eight major centers, including two transcontinental services. Saskatchewan Government Airways, based at Prince Albert, serves the forest and mineral belt of the northern half of the province. Saskatchewan has 38 per cent of the national road mileage, consisting of a network of provincial and municipal roads and the trans-Canada highway, which crosses the southern area through Regina. Interprovincial bus service is provided by Greyhound lines, and the government bus service operates on 35 routes within the province.

Telephones, Telegraphs, Radio and Television.—Telephone and telegraph lines follow the network of highways and rail lines. There are nine private radio stations, two of them French speaking, as well as the 50,000 watt Canadian Broadcasting Corporation transmitter at Watrous. For the isolated population of northern Saskatchewan there are seven provincial government stations providing radiogram service to the general public. Television stations operate in Regina and Saskatoon.

Newspapers.—Newspaper publishing in the province dates from 1878, when agricultural settlement was just beginning. Today there are four daily and over 150 local weekly newspapers, as well as weekly papers published in French, German, and Ukrainian, and several farm papers with large circulations.

PARKS AND PLACES OF INTEREST

Saskatchewan highways provide access to a variety of parks and places of interest which reflect the geography, economy, and history of the province. Cypress Hills Park in the southwest, one of six provincial parks, provides a striking contrast in vegetation and topography as compared with the surrounding plain nearly 2,000 feet below. Lower, but also well wooded, is the Moose Mountain provincial park in the southeast. The Qu'Appelle Valley, a huge gash carved by glacial waters, runs east and west for over 200 miles through the wheat lands, and contains many points of scenic and historic interest. Farther north, in the park belt, there is the saline Manito Lake, famed for the healing properties of its waters, and in the northeast central area, Madge Lake offers recreation facilities in a beautiful setting not far from historic Fort Pelly. Prince Albert National Park (1,496 square miles), one of the most popular in Canada, is located in Saskatchewan's forest belt; here, and at Lac la Ronge (110 miles farther north), camping and fishing opportunities have acquired a reputation far beyond the borders of the province. Points of historic, economic, and sporting interest in the far north (Ile à la Crosse, Stanley, and Uranium City) may be reached by air.

Special attractions in the cities and towns include: the museum of natural history, the Royal Canadian Mounted Police museum, the Mackenzie Art Gallery, and the Legislative Building and grounds in Regina; the University campus and the Western Development Museum at Saskatoon; the Fort Battleford National Historic Park at Battleford; the wild animal park in Moose Jaw; the Lund wild life exhibit and the historical society museum at Prince Albert. There are points of interest in most other urban centers, and many historic sites throughout the province (including historic trails), have been marked by distinctive highway signs.

GOVERNMENT

The Province.—The provincial government consists of a lieutenant governor, a 14-member cabinet and a 53-member Legislative Assembly, elected by British subjects 18 years of age or older. The cabinet (executive) is composed of members of the assembly and is responsible to it. The assembly meets annually, and its term is five years unless sooner dissolved. Broadcasting of selected assembly debates was inaugurated in 1946.

Premiers.—The names of provincial premiers since confederation, with the dates of their appointments, follow:

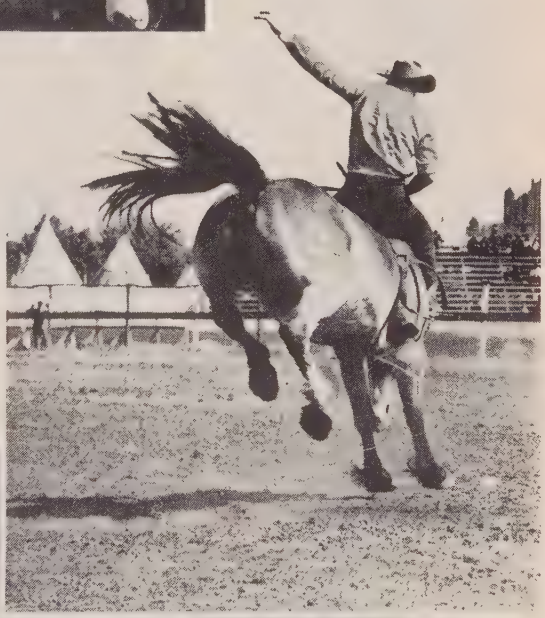
Walter Scott	Sept. 5, 1905
William Melville Martin	Oct. 20, 1916
Charles Avery Dunning	April 5, 1922
James Garfield Gardiner	Feb. 26, 1926
James T. M. Anderson	Sept. 9, 1929
James Garfield Gardiner	July 19, 1934
William John Patterson	Nov. 1, 1935
Thomas Clement Douglas	July 10, 1944

There is a large and well-organized public service staff which administers a wide variety of programs through 16 departments of government and 12 independent boards or commissions. Saskatchewan has a long record of experiment in the field of government services, and there has been frequent recourse to royal commissions to provide expert advice on problems affecting economic and social welfare. In the period since 1944 there have been many innovations and improvements in government services. Today, advanced public assistance and control measures exist in the fields of social welfare (aid to the aged, needy, blind, children, prisoners), resources' conservation, cooperative organization, industrial development, and employer-employee relations. Certain older fields of administrative activity—agricultural assistance, education, library services, highways and public health—have been greatly expanded. Of these, the most distinctive are the hospitalization plan (a subsidized scheme of compulsory hospital insurance covering every resident of the province), the air ambulance (a service operated at a nominal charge for residents of remote communities), and free treatment of cancer and mental illness. The province pioneered in the establishment of the municipal doctor system (1916) and free tuberculosis treatment (1929).

Participation of the provincial government in business enterprise began in 1909 with the establishment of the public telephone system; this was followed by other successful ventures—farm credit (1917), liquor stores (1925), and electric power (1929). Between 1944 and 1947 additional public enterprises were started as crown corporations, of which the most important and successful are the Insurance Office, the (bus) Transportation Company, the Government Airways, Forest Products, and Saskatchewan Minerals (sodium sulphate and clay products). The government fur marketing (1944) and fish marketing (1949) services, are agencies which provide facilities for producers of these products. The system of compulsory automobile accident insurance, inaugurated in 1946, is operated through the Government Insurance Office. Natural gas is being distributed by the public power corporation with an optional provision for municipal retailing.

Recent improvements in government services have been made possible by buoyant revenues.

Above: Cattle in the market pens in Saskatoon, center of an important stock-producing region.



Right: Rodeos are highly popular in the ranching areas, and riding the bronco is always one of the main attractions.

Below: A herd of cattle grazing on the range near Gull Lake in southwestern Saskatchewan.

T. R. Melville-Ness

SASKATCHEWAN

Above: Modern machinery plays a vital role in Saskatchewan's great wheat harvests. Here two large combines unload their harvest into a waiting truck.

Left: The golden wheat is transformed into flour at giant mills like this one at Saskatoon, belonging to the Saskatchewan Wheat Pool.

(Above) L. H. Shaw; (left) T. R. Melville-Ness

Right: An agricultural expert from the University of Saskatchewan conducts an implement field day for some of the province's farmers.

Below: Ready for the harvest, the swathed grain lies in patterns which follow the contour of the land.

(Right) T. R. Melville-Ness; (below) Cliff Shaw

About three quarters of net provincial revenue is derived from federal tax rental payments, general sales and gasoline taxes, and liquor sale profits; various licenses, fees, fines, and interest payments constitute the remainder. Net disbursements of capital borrowings and current revenues for 1953–1954 (est.) were for public welfare ($44.9 million), economic development ($47.5 million), general government ($7.1 million), and debt charges ($4 million).

Local Government.—The extent and prestige of provincial government services have contributed, along with straitened finances, to a relative decline in the status of municipal bodies and of popular interest in local government. There are 8 cities (minimum pop. 5,000), 89 towns (minimum pop. 500) and 388 villages (minimum pop. 100). These, along with the 299 rural municipalities (mostly consisting of nine townships), operate under the provisions of various provincial acts. The rural municipality is the taxing authority for rural telephone companies, the Municipal Hail Insurance Association, the Anti-Tuberculosis League, union hospitals, and health regions; both rural and urban municipalities raise the taxes for the school districts which are governed by their own boards. The chief local government revenues are real estate and business taxes, and a uniform system of assessment has been provided under provincial auspices for all municipalities except the larger cities. The borrowing powers of all municipalities are exercised under the supervision of the provincial Local Government Board (established 1913) to ensure a sound municipal credit structure. In the cities, public transportation is operated under municipal ownership, and four of them distribute or generate and distribute electric power.

A number of local improvement districts, varying from 26 to 96 townships in size, as well as the vast northern half of the province, have no local government organization, and various public services are provided for these areas under provincial government auspices.

Political Parties.—During the territorial period (prior to 1905) the party system did not develop in the local legislature, but following the establishment of the province the Liberal and Conservative parties appeared. The Liberals were in power from 1905 to 1929 and from 1934 to 1944. The only period of Conservative ascendancy was during 1929–1934, when a coalition government held office. In the late 1930's the Conservative party almost disappeared and the democratic socialist Cooperative Commonwealth Federation (CCF) gained strength, attaining office in 1944. Though the CCF is still the dominant party, the Liberals have sizeable voting strength and Conservative and Social Credit parties also participate in the elections. In federal politics, which is concerned with representation in the House of Commons, there has been less uniformity—the Conservatives were dominant prior to 1896, and the Liberals from 1896 to 1921; in the latter year the Progressive Party secured most of the seats. From 1926 to 1945 the Liberal Party regained its popularity, but since 1945 it has, on balance, won fewer constituencies than the CCF.

HISTORY

Fur Trade Era.—Evidences of human habitation dating from about 1400 B.C. have been found in Saskatchewan, but little is yet known of the history of the area prior to the penetration of the forest and park belt area by English and French fur traders from Hudson Bay and the eastern part of the continent. In 1774 the Hudson's Bay Company built a post at Cumberland House, which is the oldest permanent settlement in the province. The fur trade era was generally a period of peaceful coexistence between whites and Indians—the Crees and Assiniboines in the plains and forests and the Chipewyans in the far north. When Canada acquired the land between the Great Lakes and the Rockies in 1870 and organized the province of Manitoba and the Northwest Territories, the Saskatchewan area was opened to agricultural settlement for the first time. During the territorial period the nomadic Indians were cleared from the path of settlement and established on reserves, and the Canadian Pacific Railway was built across the southern plains (1882–1883). The only conflict with the aboriginal inhabitants took place in 1885, when there was a short-lived uprising of Indians and French half-breeds led by Louis Riel. By 1905 settlement had increased sufficiently to permit the establishment of a province.

1905 to Present.—Since 1905 the main feature of the history of Saskatchewan has been the rapid spread of agricultural settlement and the founding of hundreds of communities following an influx of immigrants from Eastern Canada, the United States, the British Isles, and many European countries. In the development of the prairie frontier, eastern Canadian business, religious and government institutions were active agents, and capital in large amounts was secured from the British Isles, the United States, and Europe. The pioneers created a highly productive economy, though one which has exhibited dramatic variations arising from Great Plains climatic conditions and the exigencies of international trade. The mingling and Canadianization of the various immigrant groups proceeded rapidly due to the following factors: economic conditions which produced a common outlook, the early establishment of a strong system of public education, adult education ventures of all types sponsored by government agencies and provincewide organizations, and the widespread interest in sport. Living in a province which produces over half of one of Canada's major exports (wheat), there is a firmly rooted popular sentiment favoring the reduction of barriers to international trade, and the newspaper press reflects a widespread and continuous interest in world affairs.

Possessing no metropolitan centers, Saskatchewan displays no significant cleavage of interest between urban and rural people, and the outlook and aspirations of the agricultural community have long dominated the political and social life of the province. The tradition of local cooperative activity and the prevailing view that government is an agency for cooperative achievement have since 1905 resulted in many political experiments and a wide variety of government activities; for the same reason, public opinion has generally favored strengthening federal government authority for the achievement of guaranteed minimum national standards of economic and social welfare and for the control of monopolies. The Liberal Party's early dominance (1905–1929; 1934–1944) in provincial politics was based on recruiting much of its leadership from farm organizations and on implementing the views of these organizations. The agonizing decade of

drought and depression prior to World War II led to a widespread demand for more radical measures than the Liberal Party was prepared to adopt, and in 1944 the Cooperative Commonwealth Federation was swept into office. The socialist ideology of this party has produced a variety of new ventures in public ownership and in welfare and educational services. Saskatchewan of the mid-20th century is distinguished by a mixed economy in which public, private, and cooperative ownership flourish side by side. The prosperous times since the end of World War II have produced a confident view of the province's opportunities and stemmed the population exodus associated with the depression and war years. The widespread celebrations of the Golden Jubilee of the province in 1955 betokened both confidence in the future and pride in the pioneer heritage.

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Lewis H. Thomas,
Provincial Archivist of Saskatchewan

SASKATCHEWAN, a river in Canada, which has its sources in the Rocky Mountains near longitude 115° W. It is formed by the junction of two main branches, called respectively the North and South Saskatchewan, which flow generally east to their junction, about 25 miles east of Prince Albert, Sask. Thence the river takes a curve northeast and southeast, receives the Carrot River from the south, and, passing through Cedar Lake, empties into Lake Winnipeg, after a course of about 1,200 miles measuring along the south branch. It flows through a region yielding coal, salt, iron, and gold, which has attracted numerous settlers. From the south branch of this great river northwest to Peace River the climate is adapted to the growth of wheat. The main stream and its branches are navigable for about 1,000 miles.

SASKATCHEWAN, University of, located at Saskatoon in the Province of Saskatchewan, Canada. It was established by act of the provincial legislature in 1907 and classes were begun in 1909.

The campus and farm include 1,640 acres with a half-mile frontage on the Saskatchewan River. The land, buildings and equipment are valued at $10,000,000.

The library contains 120,000 volumes, including the Shortt library on Western Canadian history. The Physics Department has a 30 million volt betatron. The Prairie Regional Laboratory of the National Research Council and other Dominion Government laboratories are located on the campus.

Courses leading to the bachelor's degree are offered in arts and science, agriculture, engineering, law, pharmacy, commerce, medical sciences, education, household science, and nursing. Master's degrees can be obtained in practically all of the above; the Ph.D. is given in a few departments. For Ph.D. work at least one year of previous university education must be taken elsewhere. This university has the sole right to grant degrees (excluding theological) in the province. The Extension Department and the Department of Correspondence Courses offer a wide variety of services to the people of Saskatchewan.

Regina College, at Regina, Sask., is a branch of the university offering first-year courses in arts and science, commerce and engineering, a two-year laboratory technicians' course, and practical instruction in music and painting.

In 1951, the University of Saskatchewan had a faculty of 185 members and an enrollment of 2,600 full-time students. Colleges affiliated are as follows: Emmanuel College (Church of England), Saskatoon; St. Chad's College (Church of England), Regina; St. Andrew's College (United Church of Canada), Saskatoon; St. Thomas More (Roman Catholic), Sakatoon; Lutheran College and Seminary, Saskatoon; Lutheran Theological Seminary, Saskatoon; Campion College (Roman Catholic), Regina; St. Peter's College (Roman Catholic), Muenster; Luther College, Regina.

W. P. Thompson,
President, University of Saskatchewan.

SASKATOON, city, Province of Saskatchewan, Canada, situated on the South Saskatchewan River, 150 miles northwest of Regina and almost in the center of the settled area of the province. The city is served by the Canadian Pacific railway, the Trans-Canada and the Canadian Pacific airlines, and the Saskatchewan Transportation Company and Western Greyhound bus lines. The city is the center of a network of provincial highways and is so strategically situated in regard to transportation facilities that it is referred to as the "Hub" city.

Saskatoon is the business and distributing center of a large grain producing area comprising over 50,000 square miles of prosperous territory. The city has some 150 wholesale establishments and more than 500 retail outlets. In addition, Saskatoon has become a great milling center, with a daily output of over 8,000 barrels of flour. There is also a flax and oil seed mill. A Canadian Government Interior Terminal Elevator, with a storage capacity of 5,500,000 bushels, offers modern facilities for cleaning, drying and storing grain.

Most of the manufacturing in the city is related to the demands of an agricultural area. In all, there are more than 150 manufacturing concerns, including iron foundries, machine shops, woodworking plants, sheet metal works, tanneries, milling establishments, oil refineries, meat processing plants, candy factories and others. The city is the site of the largest independent meat packing plant in Western Canada.

Saskatoon is the seat of the University of Saskatchewan, a secular state university. Affiliated with the university are six colleges and nine professional societies. The city has a fine educational system. There are 18 public schools and 5 separate schools, with a total enrolment of over 8,000 pupils. The three collegiate institutes, a technical school, a normal school or teacher's college, a School for the Deaf, and three business colleges round out the educational facilities.

The city is well served by radio, newspaper, and libraries. There are three radio stations. There is a daily newspaper, the *Star-Phoenix,* publishing two editions, a farmer's weekly, a

farmer's monthly, a bimonthly devoted to the business and retail trade, and the university students' newspaper. The public library system is composed of a main building in the downtown area and 3 branch libraries which serve outlying districts. The Shortt collection of Canadiana in the university library is one of the most significant collections of its kind in Canada.

Saskatoon is governed by an elected mayor and 10 aldermen, with a city commissioner. The transit system, comprising trolley coaches and gasoline buses, is municipally owned. The city also owns the water works, the electrical distributing system, and the largest of the two general hospitals. The Saskatchewan Power Corporation supplies the city with natural gas, which is available for domestic and industrial use.

Saskatoon is a beautiful city, noted for its wide streets and fine buildings. Six bridges span the river within the city limits. Three of these are railway bridges and three are for vehicular and pedestrian traffic. There are 26 parks within the city, totalling just over 450 acres in area. The city offers golf courses, curling rinks, skating rinks, tennis courts, and many other sporting facilities.

Approximately 59 per cent of the population is of British origin. The largest groups of non-British origin are the German, Ukrainian, and Scandinavian groups. The largest religious denomination is that of the United Church of Canada, followed by the Church of England in Canada, the Roman Catholics, Presbyterians, and Lutherans.

History.—Saskatoon was founded as the administrative center of a temperance colony set up in the Canadian Northwest under the aegis of the Temperance Colonization Society. This organization was made up of people in Ontario who held strong temperance views. By arrangement with the Canadian Government the society acquired a large tract of land lying athwart the South Saskatchewan River, for colonization purposes. A party under John N. Lake came west in 1882 and chose the site for the future capital of the colony. The word *Saskatoon* derives from the Cree *Mis-sask-a-too-mina,* the name given an edible berry found in the vicinity. The original settlement was on the east side of the river, but the coming of the railway in 1890 and the decision to put the station on the west side resulted in the rise of West Saskatoon. The older settlement then took the name Nutana. The stopover of the Barr Colonists in 1903 aided the center economically. Saskatoon was incorporated as a city in 1906, the three settlements of Nutana, Riversdale, and West Saskatoon amalgamating to form one unit. The city underwent a spectacular boom period during the years 1909 to 1913. The depression of the 1930's slowed expansion, but the postwar period has seen new records set in many commercial fields. Pop. (1951) 53,268.

John H. Archer,
Librarian, Legislative Library, Regina, Saskatchewan.

SASSACUS. See Colonial Wars in America—*Pequot War.*

SASSAFRAS, săs'ă-frăs, a tree of the laurel family (*Sassafras albidum*), characterized by fragrant bark and roots, common in the eastern United States. Since it is readily propagated by seeds or by suckers which spring up from interminable slender rootstocks, and is apparently not liked by cattle, it is one of the first trees to reforest pastures and fields that have the light, moist soil that it affects. It is a veritable pest to one trying to clear land, as the smallest piece of rootstock left in the soil seems to send up a vigorous sprout. Its long roots, however, make it a difficult tree to transplant, unless young. Near the lower Mississippi, the sassafras attains its greatest height (about 100 feet). It is stout, with horizontal rugged branches, so that the foliage has a stratified appearance and a flattish top; it decreases in size as its northern limit is reached until it becomes only a tall shrub. The bark on old trees is very thick and gray, with longitudinal scaly ridges; on the young twigs it is pale green and easily slips off. The shining, bright green leaves will range in shape, on one spray, from an oval to a three-lobed outline, the "mitten shape," with one lobe at the side of the leaf, being characteristic. The flowers appear before the leaves in late winter if sheltered, and are generally unisexual, male and female blooms being found on different trees. They dangle in tassel-like racemes and are honey colored and honey scented, and thus attractive to bees. The staminate flowers are apetalous, with a six-lobed calyx, orange-stalked glands and nine stamens; the pistillate flowers have a similar perianth, a pale green ovary and style, and orange rudiments of stamens. The fruits are very brilliant, dark blue, oblong, thin-fleshed berries, surrounded at their bases as the cup encloses the acorn, with a bright scarlet calyx-tube, borne on a thickened and elongated stalk. Unfortunately they are so soon taken by the birds that they are seldom seen, but in autumn the leaves assume distinct tints, which deepen from soft yellow to dark red.

The roots of sassafras very early in American history became an important article of medicine, worth three shillings a pound, and they were one of the objects for which an English expedition landed in Massachusetts in 1602. It was also called ague tree, as a decoction of its bark was supposed to cure that disease. In American household practice, sassafras tea, an infusion of the young shoots and roots, was long a favorite remedy for colds and a tonic, being a sudorific and stimulant. It is also an ingredient of root beer. The oil of sassafras is used for a perfume for soaps and the like. The wood itself is orange colored, with pale sapwood, and when stripped of its bark resists decay for some time, while in contact with soil, so that it can be made into fence posts, although too brittle and coarse-grained for most purposes.

SASSANIDS, săs'ă-nĭds, name of a Persian dynasty founded by Ardashir (Artaxerxes) I (224–241 A.D.), a descendant of Sassan (Sāsān), with Ctesiphon as its capital and orthodox Zoroastrianism as its official religion. The dynasty numbered 25 kings, chief among whom were Shapur (Sapor) II (309–379), who battled for a long time against the Romans; Kavadh I (485–531), who invaded Syria; and Khosrau I (531–579), who forced the Byzantine emperor Justinian to pay tribute and ruled the empire at its greatest extent. In the reign of Yazdegerd III (632–641) the Arabians under the banner of Islam invaded Persia and added it to their rising caliphate. Sassanid organization and institutions greatly influenced the 'Abbāsid empire.

Philip K. Hitti.

SASSARI, säs'sä-rē, commune and province, Italy, in Sardinia. The city, capital of the province of its own name, is 12 miles southeast of its port, Porto Torres. It is situated on a height 650 feet above the sea, amid orange and olive groves. It is well-built and has several handsome palaces, churches, monasteries, nunneries, colleges, universities, an old citadel, a library, and a hospital. There is varied manufacturing; trade is carried on in grain, fruits, oil, cheese, and goatskins. The province occupies the north part of the island, having an area of 2,903 square miles. Pop. (1951) of commune, 70,243; of province, 349,625.

SASSOFERRATO, Il, ēl säs'sô-fâr-rä'tô (real name Giovanni Battista Salvi), Italian painter: b. Sassoferrato, Ancona, Italy, Aug. 25, 1609; d. Rome, Aug. 8, 1685. He learned the elements of his art from his father, and afterward went to Rome and Naples and studied under Raphael, Il Domenichino, Guido Reni, and Francesco Albani. His paintings, whose subject is chiefly the Madonna and Child, are filled with deep and true feeling and the coloring especially is elaborated with exquisite care, the principal scheme of his pictures including warm, luminous flesh tints, bright blue scarfs, and crimson robes, beautifully harmonized with consummate skill.

SASSOFERRATO, town, Italy, Ancona Province, seven miles north-northwest of Fabriano. Il Sassoferrato (q.v.) was born here. Nearby ruins of Sentinum recall a victory of the consuls Fabius and Decius there against Gauls and Samnites in 295 B.C. Pop. (1951) 13,498.

SASSOON, Siegfried (Lorraine), English poet: b. Sept. 8, 1886. Member of a Spanish-Jewish family which acquired wealth in the India trade in the 19th century, he was educated at Marlborough Grammar School and Clare College, Cambridge. During World War I he served in the army with distinction in France and Palestine. Beginning in 1919 he was for some years literary editor of the *Daily Herald*. His poems and prose works include *The Old Huntsman* (1917); *Counter-attack* (1918); *Satirical Poems* (1926); *The Heart's Journey* (1928); *Memoirs of an Infantry Officer* (1930); *The Weald of Youth* (1942); *Collected Poems* (1947); *Meredith: A Biography* (1948).

SATARA, sä-tä'rà, former district, India, with the mountain range now known as the Western Ghats as its boundary, extending eastward over an area of 4,891 square miles in central and southern Bombay Province. Ruled by the Muslim Bahmani kings from the 13th through the 15th centuries, it passed to the Bijapur monarchs and reached its zenith as an independent kingdom of the Mahrattas in the 18th century, with the town of Satara as the capital. The British controlled the region from 1818 and governed it directly from 1848. Pop. (1941) 1,327,249.

SATARA, town, India, capital of Satara North District, about 115 miles southeast of Bombay, lying at an elevation of 2,200 feet between two ridges. Now a center of trade, it was the seat of Mahratta rajas of the 18th century. A "modern" palace, built between 1838 and 1844, remains a point of interest, as does an older palace and a fort captured by the British in 1818. Satara Road, a former way station 10 miles to the northeast, boasts an important engineering plant engaged in the manufacture of machine and agricultural tools, internal combustion engines, and other aids to the growing Indian economy. Pop. (1941) 36,405.

SATARA NORTH, district, India, in south central Bombay Province. It lies between the Nira River, its northern boundary, and Satara South District. It was created in 1949 from the northern portion of Satara District and additional territories. The capital is Satara. Wheat, millet, rice and peanuts are grown and the well-forested mountains to the east provide teak and other woods. Mahabelshwar is a famous resort town. Pop. (1951) 1,175,309.

SATARA SOUTH, district, India, constituting the southern part of the former district of Satara and parts of seven former states. It came into existence in 1949 as the southern neighbor of Satara North. The Kistna River drains its western portion and flows through Sangli, the capital. The weaving of cloth is a common occupation but agriculture is the chief industry, with sugar cane, tobacco, cotton, and millet among its products. Pop. (1951) 1,000,141.

SATELLITE, Artificial, an object placed in an earth-circling orbit by means of a multiple-stage rocket, which lifts it from the earth's surface to its orbit in space. A true satellite orbit is an ellipse with the earth's center at one focus of the ellipse (Fig. 1) and is controlled completely by the earth's gravitational field (see Gravity). If the orbit does not intersect the earth and the satellite does not experience the drag of the lower atmosphere, it will last for a long time. If the orbit descends to as low as 100 miles, the satellite's lifetime will be of the order of a few days; its exact value depends on the size and weight of the satellite vehicle. If there were no atmosphere, a satellite could operate at sea-level altitudes. The plane of the orbit must contain the center of the earth but may have different orientations: it may contain the equator (equatorial orbit), or the poles (polar orbit), or it may be inclined (Fig. 2). This orientation is a matter of choice and design, since the orbit is determined completely by the magnitude and direction of the velocity at the burnout of the last rocket stage (see Rocket). In order to make the orbit as nearly circular as possible, the burnout velocity should be horizontal and have the value of the circular velocity. This velocity decreases with increasing altitude and at 300 miles corresponds to 4.737 miles per second. To achieve a near-circular orbit which will last for more than a few days, this speed must be controlled to about 1% and its deviation from the horizontal must be less than 1°. The orbital period at 300 miles is 94 minutes and 10 seconds; it increases with increasing altitude (Fig. 3). At this orbital altitude, which corresponds to that of a minimum satellite,[1] the only important astronomical perturbation is due to the non-spherical shape of the earth (see Solar System—*The Lunar Problem*). Because of this, the orbital plane will precess (see Equinoxes, Precession of the), if it is inclined (Fig. 4). There are no first-order perturbation effects in polar and equatorial orbits; however, very small gravitational effects are produced by the sun, the moon, and terrestrial mountain ranges.

[1] The elliptical shape of the orbits employed may cause the satellites to range from a minimum distance (perigee) of 200 to 250 miles to a maximum distance (apogee) of 800 to 900 miles.

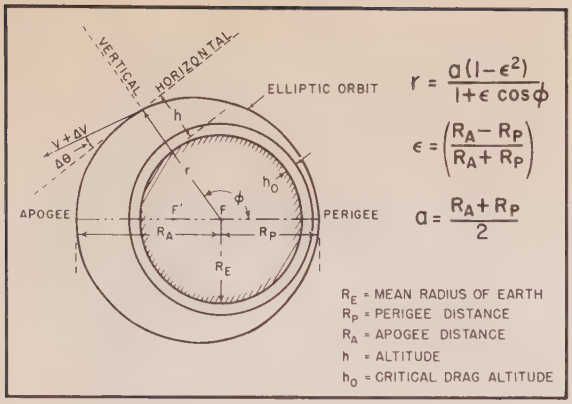

FIG. 1. EQUATION OF ORBIT. The orbit in general is an ellipse whose apogee and perigee altitudes are determined by the launching error in speed, $\triangle V$, and in inclination, $\triangle\Theta$. In order to obtain a long lifetime for the satellite, the perigee must be kept above at least 100 miles. This places severe limits on the allowable launching errors.

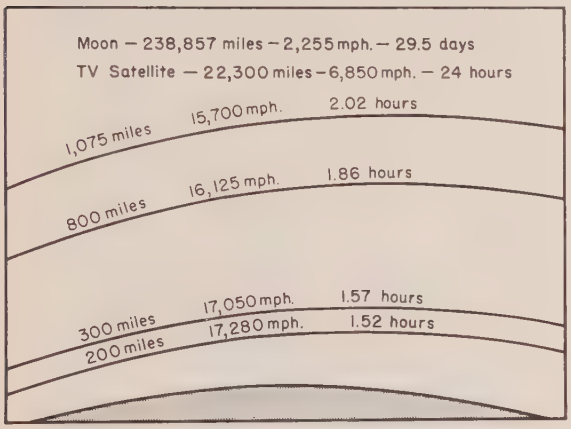

FIG. 3. Orbit characteristics giving altitude, speed, and period of revolution.

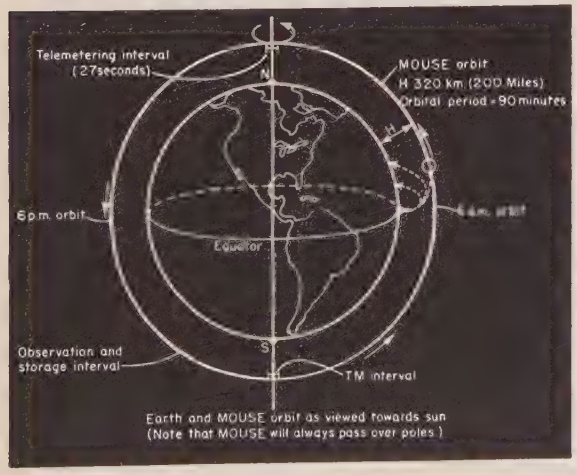

FIG. 6. Diagram showing the launching of a satellite in a polar orbit. Since this satellite passes over the poles during every orbit, the information to be transmitted is stored and then released in a brief telemetering interval over the poles.

SATELLITE, ARTIFICIAL

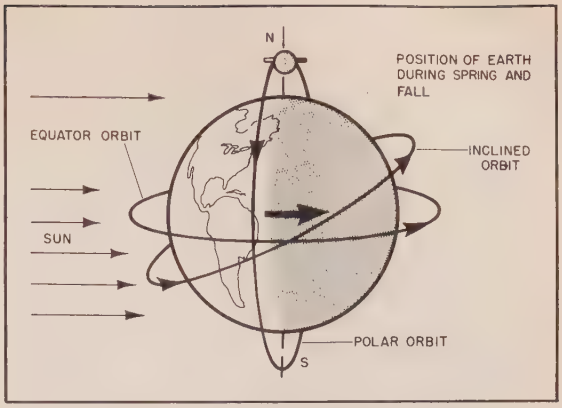

FIG. 2. POSSIBLE SATELLITE ORBITS. The position of the orbital plane is determined by the direction of the burnout velocity of the last rocket stage. During mid-summer and mid-winter the sun's rays will be inclined 23½° to the earth's equator.

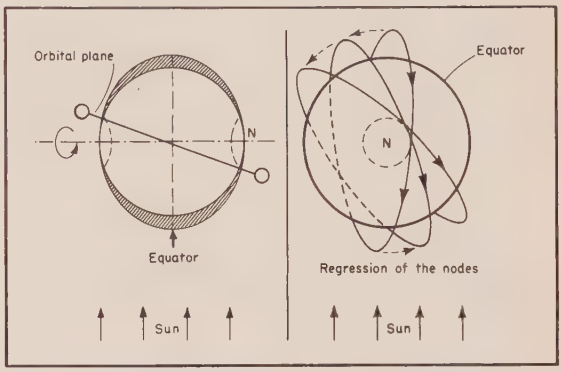

FIG. 4. ORBIT PERTURBATIONS. The equatorial bulge of the earth will produce a gravitational action on the satellite which causes the satellite orbit to rotate in space, producing a regression of the nodes.

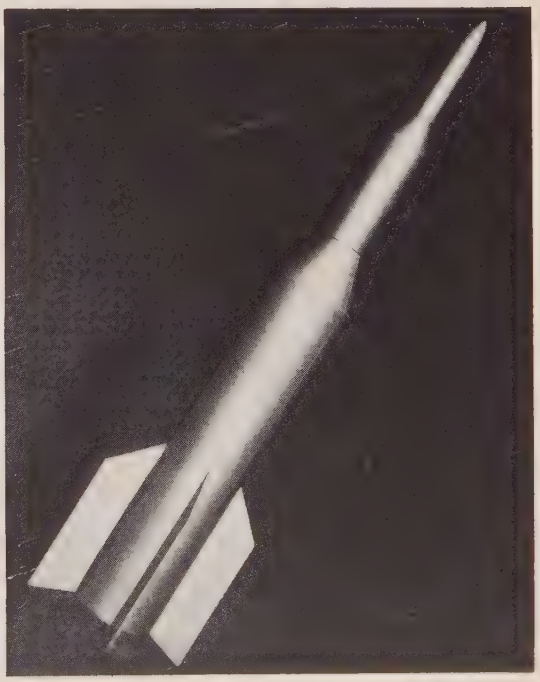

FIG. 5. Model of three-stage rocket for providing the necessary orbital velocity. The satellite is housed in the nose of the final stage.

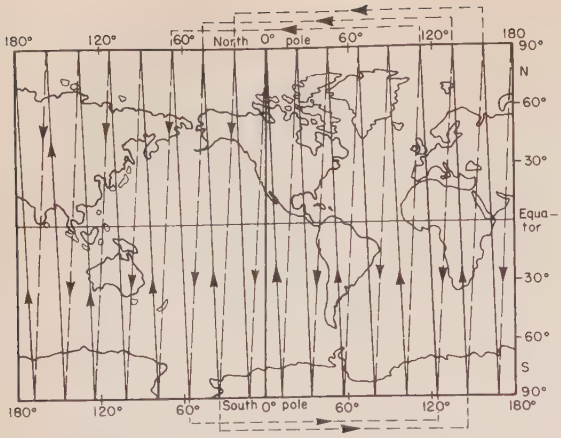

FIG. 7. Trace of MOUSE orbit over earth (period = 90 min.). S–N path 6 A.M., N–S path 6 P.M. local time.

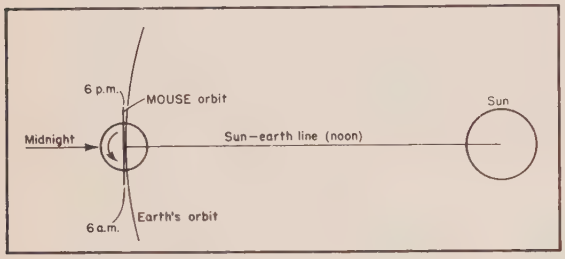

FIG. 9. Diagram showing the orbit of a MOUSE satellite perpendicular to the sun-earth line. Note that the satellite appears overhead only at 6 A.M. or 6 P.M. local time.

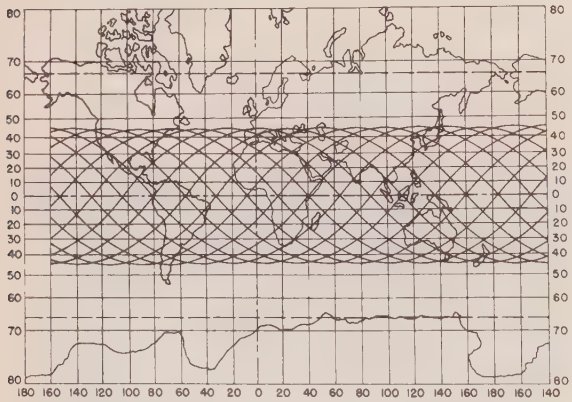

FIG. 11. Trace of an inclined-orbit satellite over the earth's surface.

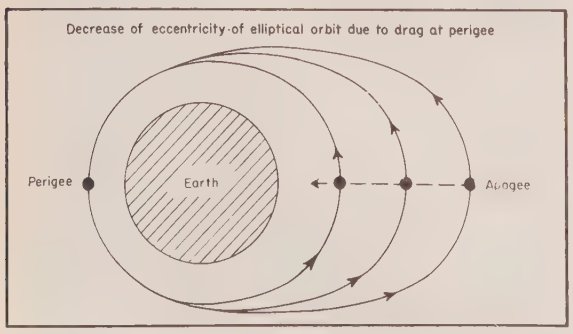

FIG. 12. An elliptical orbit will shrink into a near-circular orbit due to atmospheric friction. After that the satellite will spiral rapidly into the earth and disintegrate in the atmosphere.

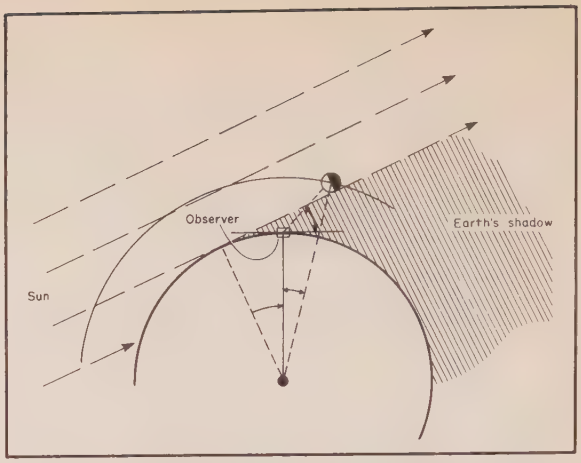

FIG. 8. OPTICAL VISIBILITY OF SATELLITE. A small satellite would be practically unobservable with the naked eye. With the help of optical instrumentation it can be observed for short times only when the sun is just below the horizon. The optimum condition is achieved when the lower atmosphere is in the earth's shadow and the satellite, high up, is illuminated by the sun's rays. However, to find the satellite, the optical instrumentation must have a wide field of view, and it should also be able to track the satellite.

Diagram of gyroscopic stabilization scheme, solar power supply, and astrophysical instrument

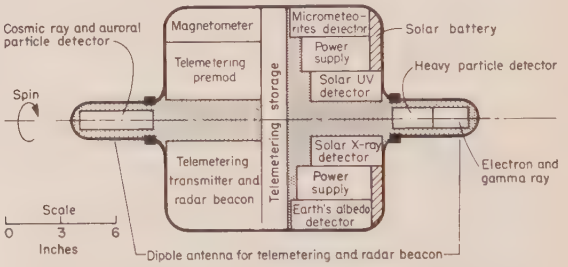

FIG. 10. SCHEMATIC DIAGRAM OF MOUSE SATELLITE. Geiger counters are used for the detection of cosmic rays, and special counters for auroral particles and heavy cosmic ray particles. The solar UV and X-ray detectors could be photon counters. The earth's albedo detector is a simple photocell. The magnetometer could be based on the proton precession principle.

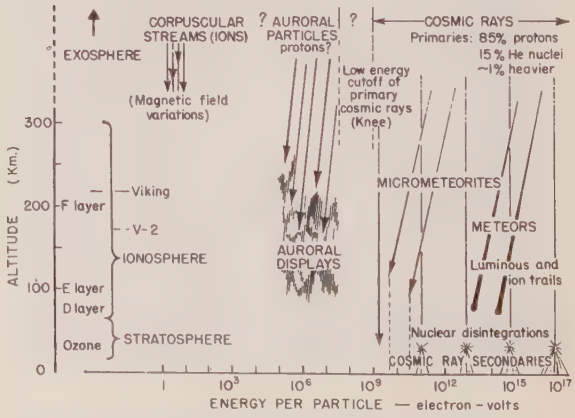

FIG. 13. PENETRATION OF PARTICLES INTO THE ATMOSPHERE. Particles arriving from outer space are stopped or modified by the atmosphere and must, therefore, be observed above the atmosphere.

Propulsion.—Propulsion by means of rockets is necessary, since the high velocities of orbital revolution must be attained above the atmosphere where rockets alone will operate; in the lower atmosphere, a satellite travelling at these speeds would heat up too much and melt. In order to achieve the high velocities, it is necessary to construct rockets of very high mass-ratios, that is, ratios of propellant load to gross weight. This ratio is always less than unity because of the unavoidable weight of the rocket structure. It is possible, however, to achieve an effectively high mass-ratio by employing the so-called step-rocket principle (Fig. 5). Here successively smaller rockets are superimposed in tandem and operate one after the other while the burnt-out stages fall away. In this way the final payload, although of very small weight, can achieve the necessary high velocity. The optimum number of stages is in the vicinity of three. If more stages are used, the take-off weight decreases somewhat but the complexities become enormous. If only two stages are used, the first rocket must be quite huge. The first rocket stage must traverse the atmosphere rapidly and is therefore launched in a vertical direction. It continues its vertical ascent until it reaches the limit of the appreciable atmosphere. It then begins to tilt, and this is carried on by the succeeding propulsion stages until the final velocity vector has the correct value and points to the horizontal. This can be done through radio guidance or through a preset program which tilts the rocket jet by means of gyroscopic control (see GUIDED MISSILES). In general, two types of ascent trajectories are possible: 1) a powered-all-the-way trajectory in which successive stages burn without any coasting gaps, until the final desired velocity is reached; or 2) an initial burning period followed by a coasting period to the desired altitude where a final thrust is applied to achieve the necessary velocity. The latter method is more economical since it utilizes the available propulsion more efficiently; however, it requires more elaborate controls. Once in its orbit, the satellite needs no further propulsion.

Effect of Environment.—In addition to gravitational influences of the earth and other celestial bodies, a satellite is subjected to various outer-space radiations incident on the earth as well as to radiations emanating from the earth; the satellite also undergoes collisions with atmospheric molecules and atoms, and with meteoric dust. Most of the energy absorbed by the satellite comes from the sun. Solar radiation is also reflected upward from the earth (the so-called albedo radiation). These sources of energy serve to heat the satellite until it reaches an equilibrium temperature. The value of this temperature is controlled by the surface properties of the satellite, by possible internal heat sources in the satellite, and by the type of orbit the satellite takes about the earth. The albedo of the earth, produced mainly by reflections from clouds, also has an influence on the equilibrium temperature. In most cases these temperatures will be quite reasonable; therefore no special materials have to be used to construct the satellite. Ultraviolet radiation from the sun and from other celestial sources will in general have no deleterious consequences on the satellite structure except perhaps on plastic windows. It is believed that the intensity of X-rays and gamma rays above the atmosphere is too low to be of any concern. The effects of cosmic rays are quite small although they may produce cumulative nuclear transmutations in satellites remaining above the atmosphere for very long periods of time; these are of importance mainly in the transistors and other semi-conductor devices in the electronic instrumentation. More serious are the effects of meteoric dust particles and occasional larger meteors (q.v.). They will erode the surface of the satellite and may, if of high enough momentum, pierce the skin of the satellite. They may constitute a real hazard during periods of meteor showers when the frequency of meteoroids is much enhanced.

Selection of Orbits and Communication Problems.—One of the important considerations is to select an orbit for the satellite which is both convenient from the propulsion point of view and useful from the instrumentation point of view. An equatorial orbit is the easiest to achieve since the required orbital velocity would utilize the 960 miles per hour rotational velocity which the earth possesses at the equator. Unfortunately, the area of the earth's surface traversed in this orbit is a minimum and many geophysical investigations in which all latitudes have to be covered could not be carried out using this orbit. On the other hand, a single receiving station located on the equator would be in communication with the satellite for a short time during every orbit. An orbit across the poles (Fig. 6) would require somewhat more propulsion effort for a given payload. Here all of the earth's area (Fig. 7) would be traversed since the earth rotates underneath the orbit while the orbital plane remains fixed in space. If it is desired to observe the satellite continuously (Fig. 8), many receiving stations would have to be used. However, if it is sufficient to receive communications from the satellite once or twice during every orbit, a station at one or both poles would be adequate. This orbit is the most useful one from the geophysical point of view since the latitude dependence of many phenomena, such as cosmic rays, could be studied. If, in addition, the orbital plane is nearly perpendicular to the sun-earth line (Fig. 9), then the satellite will be in sunlight all of the time if launched near the equinox, and most of the time if launched in mid-winter or midsummer. This is the particular orbit contemplated for the MOUSE (acronym for Minimum Orbital Unmanned Satellite of the Earth), which is designed for geophysical and astrophysical observations (Fig. 10). In this orbit the satellite will not only be able to observe the sun's radiation for most of the time, but it can also obtain energy from the sun to run the radio transmitter and other instrumentation. In order to view the sun continuously the MOUSE satellite is oriented in space by spinning it about a horizontal axis which points towards the sun. This satellite is then essentially a gyrowheel. Since to a first approximation no torques are acting on the satellite, this spin axis will keep pointing at the sun as the satellite travels around the earth. It is possible to devise other means for giving the satellite a certain orientation in space, but they are more complicated. An orbit which is inclined to the equator (Fig. 11) would cover a large portion of the earth's surface but would be difficult to observe or communicate with unless a large number of ground receiving stations were used.

General Instrumentation of a Satellite.—A satellite which is to be used for recording extra-terrestrial radiations must transmit this information to the ground; it therefore needs a radio

transmitter and a supply of electrical power. Because of their large weight there is a limit to the number of chemical batteries which can be provided. It should be possible, however, to convert solar energy into electrical energy, for example, by means of the silicon solar battery (see SOLAR POWER—*Solar Batteries*). With an efficiency of about 10 per cent the power generated can be as high as 0.1 watts per square inch of surface area.

Applications of a Satellite.—By merely observing the orbit of the satellite and its changes with time it is possible to deduce the satellite's drag (Fig. 12) and, therefore, the densities of the upper atmosphere. Observations of the orbit for long periods of time also permit calculation of the major perturbations, principally due to the shape of the earth.

Various measurements of extraterrestrial radiations (Fig. 13) and atmospheric properties are possible, among which are the following: 1) *Cosmic Rays.* The variation of cosmic ray intensity can be measured as a function of time. By making use of the fact that the earth acts as a magnetic spectrometer for the electrically charged cosmic ray particles, the energy spectrum of the radiation can also be determined. It is important to measure these quantities during periods of solar activity (see SUN) to determine how the cosmic rays are accelerated by the sun and influenced by interplanetary conditions. An important refinement also would be to measure, during solar activity, any changes in the composition of the primary cosmic radiation from the normal distribution of 85 per cent protons, 14 per cent helium nuclei and 1 per cent heavier nuclei. 2) *Solar Ultraviolet and X-rays.* The satellite could measure intensity changes of these radiations during periods of intense solar activity. This would aid both in the study of the basic processes occurring in the solar atmosphere and also in the study of the effects of these radiations on the earth's ionosphere. 3) *Earth's Magnetic Field.* By measuring with a magnetometer the variations with time of the earth's magnetic field at high altitudes, it is possible to determine the position and strength of currents flowing in and above the earth's atmosphere. 4) *Earth's Albedo.* By measuring the amount of sunlight reflected from the earth, a satellite can determine the degree of cloud cover, its distribution, and variation with time. This may have important applications in long-range weather prediction. See also ATMOSPHERE; COSMIC RADIATION; EARTH; ROCKETS; SPACE RESEARCH; TERRESTRIAL MAGNETISM; UPPER ATMOSPHERE; UPPER ATMOSPHERE, SOUNDING METHODS OF THE—*Rocketsonde Research.*

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SATELLITE COUNTRIES, a term used in international relations to describe nations which fall within the orbit of power and influence of some other nation or nations. A satellite country has less political and economic power than the nation dominating it, and generally supports the latter's policies in international relations. In power politics, the world is made up of a small number of dominant nations and a large number of satellite nations.

SATELLITES, in astronomy, secondary planets or moons. One satellite has been observed with Neptune; five with Uranus; Saturn has nine or 10, Jupiter 11, Mars two, and the earth one. The rings of Saturn have been said technically to be composed of a great number of satellites, but these are probably exceedingly small, and are possibly not larger than particles of sand or dust.

SATIN, in textile manufacture, a closely-woven silk, in which the weft is hidden, presenting a glossy surface. In the manufacture of other silken stuffs each half of the warp is raised alternately; but in weaving satin the workman only raises the 5th, 8th or 10th part of the warp; thus the weft is hidden beneath the warp, which, presenting an even, close and smooth surface, is the more capable of reflecting the rays of light. In this way satin acquires that luster and brilliancy which distinguish it from most other kinds of silks. Sometimes satin is made with a pile and flowered pattern and it is then termed satin-damask. Satin was first woven in ancient times in China. Early European seats of satin manufacture were Lyons, France, and Genoa and Florence, Italy. Modern manufacture varies fiber, weight, and quality, so as to produce a number of kinds of satin. Silk warp and cotton filling constitute slipper satin. From the East Indies come those light stuffs called Indian or Chinese satins. They are plain, damasked striped, open-worked, or embroidered. See also WEAVING, HAND LOOMED.

SATIN BOWERBIRD. See BOWERBIRDS.

SATINFLOWER. See STAR-OF-BETHLEHEM.

SATIN SPAR. See SPAR.

SATINWOOD, the product, principally of the *Chloroxylon swietenia,* of India and Ceylon. This is a small tree with large panicles of whitish flowers and deciduous, long, pinnate leaves, and can furnish a log three to six inches square. The wood is very hard, close-grained and durable, and light orange in color; it takes a fine polish and when of the feathered variety is very beautiful, but liable to split. In the 18th century this ornamental wood was much in demand for handsome furniture, with scroll work, and with medallions painted upon it. It is now principally used for cabinetwork, for picture frames, the backs of brushes and marquetry. Several other species of trees in the East and West Indies, especially the *Maba buxifolia* and *Xanthoxylum caribaeum,* produce woods of similar appearance, quality and name.

SATINET, an inferior fabric, woven much thinner than ordinary satin. The name is also given to a kind of cloth woven, with cotton warp and woolen weft, to imitate satin.

SATIRE, a kind of literary composition in verse or prose, in which wickedness or folly is censured and held up to reprobation; it is a

word of Latin origin, and the ancient Roman poets were the chief inventors of the satire. From the time of Lucilius (d. c.102 B.C.) till now, says Dryden, "the very name of satire is formidable to those persons who would appear to the world what they are not in themselves." Of the four princes of Roman satire—Lucilius, Horace, Persius, Juvenal—Persius (d. prematurely in the reign of Nero) is the least important. Juvenal (who appears to have produced satires in the reign of Domitian and who survived into the time of Hadrian, 117 A.D.) uses satire with consummate power and spirit, as an engine for attacking the brutalities of tyranny and the crimes, the follies and the frenzies of a degenerate society: he is confessedly the foremost satirist not only of ancient but of all times: great modern poets of all countries have translated or imitated the 16 satires of Juvenal; and he has been better translated into English than almost any other ancient poet. Horace (Augustan period) developed satire into a branch of composition peculiarly his own, and in this branch he is without a rival: he ridicules the follies of the world from the point of view of a man of the world; and though his morality does not rise above the level of a prudential moderation, he enforces it with so much dramatic liveliness and gay humor that he has ever been the favorite poet of men of letters and epigrammatists.

A totally different form of satire is the medieval *Reynard the Fox, Till Eulenspiegel, Piers Plowman;* followed in the Reformation epoch by Ulrich von Hutten's *Epistolae Obscurorum Virorum,* Erasmus' *Praise of Folly,* Rabelais' *Gargantua,* Buchanan's *Franciscanus,* and others. In Spain, where no freedom of criticism existed, the spirit of satire took refuge in the picaresque novel, prototype of Lesage's *Gil Blas;* Cervantes' *Don Quixote,* too, might be classed as a satire were it not so much more. Most of the great dramatists of the 17th century were more or less satirists; among them Molière stands pre-eminent. Butler's *Hudibras* is a model of unadulterated satire; and political satire is carried to perfection in Dryden's *Absalom and Achitophel.* Swift excelled at satire. In France, Nicolas Boileau-Despreaux was regarded as the modern Horace in satire and in the mock-heroic, but in both respects he was equaled or even surpassed by Pope. In Germany the most conspicuous satirist was probably Christoph Martin Wieland. In England in the 19th century, the foremost satirists were Byron, Hood, Hook, Jerrold, and, among novelists, Thackeray; in the United States, James Russell Lowell, through the *Biglow Papers,* held high rank in political satire. In the 20th century such English-language novelists as Aldous Huxley, Evelyn Waugh, and Sinclair Lewis made use of satire, the first two, particularly, mixing it with fantasy and farce.

SATISFACTION, in law, the satisfying of an obligation or claim, as by performance, payment, or giving an equivalent; indemnity for an injury. The doctrine of satisfaction is of importance in the interpretation of wills and also in the law of contracts. For example, if a debtor by will bequeaths to his creditor a legacy at least as great as an existing debt, such legacy is held to be a satisfaction of the debt in the absence of any circumstance rebutting this presumption. Likewise it has been held that where a person has agreed to manufacture, to the satisfaction of the buyer, an article, as an engine, in which personal taste is not directly involved, but merely mechanical utility, the buyer is bound by the contract if he has no reasonable grounds for refusing the article after its completion.

SATOLLI, sä-tōl'lē, **Francesco,** Italian ecclesiastic: b. Marsciano, Perugia, Italy, July 21, 1839; d. Rome, Jan. 8, 1910. He became professor of dogmatic theology at Urban College of the Propaganda, Rome (1880), and in 1888 was made archbishop of Lepanto. He came to the United States in October 1892 as appellant judge with extraordinary discretion. His action in regard to several notable church controversies raised up a party of opposition against some of his proposed measures in ecclesiastical affairs in America. In January of the next year an order came from Rome quelling the opposition and creating Monsignor Satolli permanent American apostolic delegate. He was named cardinal in 1895, and he returned to Rome in 1896.

SATRAPS, sā'trăps or săt'răps, the name given the governors of provinces in the ancient Persian empire. The power of the satrap, so long as he retained the favor of his sovereign, was absolute; he levied taxes at his pleasure and aped the capricious tyranny of his master unchecked. When the monarchy of Cyrus began to decline many of the satraps threw off their allegiance and founded independent kingdoms of their own. The term "satrap" is sometimes used to signify a petty despot.

SATSUMA, săt-sōō'mȧ, Japan, former province in the southwestern part of the island of Kyushu, now a part of the prefecture of Kagoshima. It played an important part in the history of Japan, and before the revolution of 1868 it was one of the most powerful feudal strongholds. Its samurai ably supported the revolution which placed the mikado in power, and readily yielded their prerogatives in order to secure a stronger nation. However, they rose in rebellion under Saigo Takamori in protest against the predilection of the court for instituting foreign customs in 1877; but the rebellion was put down. The province manufactured a beautiful porcelain, known as Satsuma ware.

SATSUMA WARE, a fine kind of pottery or semiporcelain made in Japan, having a feldspathic glaze of a light straw color, the surface of which is covered with a network of fine cracks. Red and green colors and dulled gold are employed for decorating the ware. Fine old Satsuma ware is highly esteemed by collectors. See JAPANESE CERAMICS; POTTERY—*History.*

SATURDAY, so called from the planet Saturn, the seventh day of the week; the Sabbath of the Jews. It is called by the Italians *Sabato;* by the French, *Samedi* and by the Germans, *Sonnabend* (Sunday eve), or in High German, *Samstag,* a corruption of *Sabbathstag* (Sabbath day); and in Low German, *Saturdag,* of the same origin as the English.

SATURN, an ancient Italian divinity, husband of Ops and father of Picus. He was the god of seed time and harvest, and is represented as bearing a sickle. He was later identified with the Greek Cronus, who, driven from his

supreme throne by Zeus, came to Latium and set up his kingdom there. Under his reign was the Golden Age. At Rome his throne was shared by Ops, afterward identified with Rhea, and in the time of the last Tarquin a temple was built to him at the foot of the Capitol and was afterward used as the treasury (Saturni Aerarium). The foundations of this temple and eight pillars still remain. The statue of Saturn was all year long swathed in woolen bandages excepting during his festival, the Saturnalia (q.v.), when it was uncovered to the eyes of the people.

SATURN, the sixth planet from the Sun, and the second largest in the solar system, is further distinguished by having a system of rings which makes it the most spectacular of the planets. It was the most distant known to the ancients and so continued until the discovery of Uranus in 1781. The disk is yellowish in the telescope. Its brightness at opposition varies from −0.4 to +0.9 magnitude. The first coincides with the time when the plane of the rings is at its largest angle of 27° as seen by us, the second when they are seen edgewise. In the first case, the apparent width of the rings is about one half the length. It is, therefore, obvious that the rings may reflect more light to us than the planet itself, assuming that, area for area, the rings reflect light equally well. Since it is a superior planet it is best observed near opposition. Its sidereal period being 29.6 years, an opposition will occur about 13 days later each year than in the previous one. The last occurred on April 28, 1954.

Shortly after Galileo had invented a telescope, on studying Saturn in 1610 the planet seemed to him to have handles, or, in a sense, to be triple. For some decades observers, with the crude telescopes then available, drew it in various fantastic shapes. It was all the more mysterious as sometimes (when we passed through the plane of the rings) the planet appeared round, then slowly the extensions came back into view. Finally in 1655 Christian Huyghens, after careful study, announced that "the planet is surrounded by a thin, plane ring nowhere touching it, and inclined to the ecliptic." The planet's orbit has a semi-major axis of 9.53884 astronomical units which corresponds to 887,140,000 miles. However, due to the large eccentricity of 0.05570, when at perihelion Saturn is only 837,726,000 miles from the Sun, while at aphelion it is 936,554,000 miles. If, therefore, opposition occurs when Saturn is near perihelion, the planet may be 99 million miles nearer the Earth than in the latter case.

The planet at mean distance has an equatorial diameter of about 17″.3, corresponding to a linear diameter of 74,500 miles. Due to irradiation the value may be uncertain to nearly 1 per cent. It is the most flattened of all the planets, its polar diameter being 7,800 miles less than the equatorial. In terms of the Earth its surface is 81 times, its volume 735 times, and its mass 95 times greater. The mass of Saturn is particularly well determined both from observations of its numerous satellites and also from the perturbations it produces upon Jupiter. Indeed, as these two, which are the largest of the planets, may approach within four astronomical units of one another when closest, their mutual perturbations are very large. The result is that the elliptical orbits of both planets are considerably changed in shape due to the gravitational pull of the other. It has the lowest planitary density, 0.72, that of water. Saturn would float, could one find an ocean large enough. A mass would weigh 1.17 times, by a spring balance, what it would upon the Earth, but this number would vary greatly in different latitudes, being least at the equator. Its belts are far less well-defined than those on Jupiter, and are largely lacking in detail. They run parallel to the equator. Yellow and green colors predominate. Spots occur very occasionally: those near the equator give 10 h. 14 m. as the rotation period, but one in latitude 36° N. gave 10 h. 38 m. The last prominent spot appeared in 1932. The rotation can also be determined by the spectroscope, which proves that the period increases considerably as the poles are approached. Like the Sun and Jupiter, its surface therefore shows the equatorial acceleration. The planet's axis is inclined 26° 45′ to the plane of its orbit, and the latter is only 2.5° from the plane of the ecliptic. The rings lie in the plane of Saturn's equator. At the equator, centrifugal force equals one sixth that of gravity. By using the ratio of this to the ellipticity of the planet, a result of 0.65 is found. This proves a great central condensation. The model worked out by Rupert Wildt indicates that the solid core (probably partly iron-nickel) has a radius of about 13,000 miles, covered by a layer of ice 8,000 miles thick, which in turn supports an atmosphere of compressed gases 15,000 miles deep. These latter, according to spectroscopic evidence, consist largely of methane and ammonia, the first stronger, the latter weaker than similar absorption bands in Jupiter's atmosphere. Saturn receives little more than 1 per cent of the solar radiation on the Earth, hence, as expected, its surface temperature is low. Direct measurements give about −150°C. Henry N. Russell, however, states that this is a considerably higher temperature than direct solar radiation should cause. As there can scarcely be appreciable radiation from the interior, any difference is difficult to explain. As with the Sun and Jupiter the edges of the disk are less bright than the center. The albedo is about 42 per cent. It is obvious that no form of life, such as life is known on the Earth, could possibly exist on Saturn or, for that matter, on any of the five outer planets.

The rings not only make the planet a most beautiful object but have presented scientists with most interesting problems. The rings are usually indicated by the letters *A, B, C*—the order being from outside towards the planet. First, as to dimensions, the maximum diameter is 171,000 miles. Ring *A* is about 10,000 miles wide and is not as bright as *B*, from which it is separated by the Cassini division, discovered in 1675 by Jean D. Cassini at the Paris Observatory. This latter is perhaps 2,500 miles wide but looks much narrower, due to irradiation. Ring *B* is 16,000 miles wide, and near its outer edge is as bright as the planet itself. It, in turn, is separated from *C*, the "crape ring" by a space about 1,000 miles wide, while *C* itself is 11,500 miles in width and its inner edge 7,000 miles from Saturn's surface. The thickness of the rings is extremely small: most authorities give about 10 miles. Strange to say, *C* was discovered only in 1850 by William C. Bond at Harvard Observatory, and independently, two weeks later, by W. R. Dawes, in England. Why it was not detected earlier it is difficult to say. The extreme thinness of the rings is proved by their becoming invisible for a day or

two when we pass directly through their plane and they are edgewise to us. This occurs twice per revolution of Saturn or at 15-year intervals. It will next occur in 1965. The Earth, during such years, actually passes once or three times through the plane of the rings, according to circumstances. At about 7½ years from such transits, the rings open up to their widest, as we see them.

A century ago it was shown theoretically by Benjamin Peirce and James Clerk Maxwell that neither a solid nor liquid ring could be stable. If one could be created and placed about the planet, perturbations of the satellites would eventually break it into fragments. In 1857 Maxwell proved that a ring composed of innumerable little solid bodies, provided their total mass was small, would be stable. Also, in 1850, Edouard Roche proved that a liquid satellite of any planet, if its density and the planet's were the same, would be distorted by the latter's tidal forces, provided it lay outside a distance equal to 2.44 radii of the planet; if it came inside this critical limit, tidal forces would tear it to pieces. Saturn furnishes an excellent practical example, for the outer edge of the rings lies only 2.30 radii from the planet's center, while Mimas, the innermost satellite, is at 3.11 radii. The latter is, therefore, beyond the danger limit, all of the rings being well inside. These facts give us a possible explanation for the rings because, if one or more satellites, either fully formed or embryonic, ventured within the 2.44 limit, they would have been destroyed. At first, the separate pieces would follow somewhat intersecting orbits, but as time went on there would be constant collisions, the results of which would both make the fragments smaller and the orbits more circular. By now all the fragments are very small indeed. While theory a century ago had predicted the composition of the rings, it remained for the spectroscope to give proof by actual observation. It is readily seen that were the rings solid a particle on the outside edge would have a higher linear velocity than one on the inside edge. On the contrary, were the rings made up of small particles, each free to move under gravitation then, by Kepler's third law, the inner ones would move faster than the outer. The spectroscope had so improved by 1895 that James E. Keeler at Allegheny Observatory was able to make the critical observations, and to prove that the inner edge moved faster, thus corroborating the theory. Keeler's actual measurements were, for the outer edge a velocity of about 10 miles per second, for the inner about 12 miles per second. The edges therefore revolve with velocities which small satellites would have at such distances from the planet. The velocity of the surface itself at Saturn's equator is 6.4 miles per second. With more powerful modern instruments the velocity of both inner and outer edges can be much more accurately determined. The density of particles in the rings varies: in *B* they must be fairly closely packed, and it is opaque. Ring *A* is partly transparent, tested by observing its transit over a star. Were there beings on Saturn to admire this strange appendage stretching across both day and night sky, they would have a phenomenon which for grandeur would have no equal in our solar system. The position of the Cassini division is not due to chance. Particles within it would have a period equal respectively to ½, ⅓ and ¼ the periods of the nearest three satellites. Evidently this is another resonance effect, so well known in the asteroid zone when certain even fractions of Jupiter's period are taken. Further, the boundary between rings *B* and *C* corresponds to the position of a particle whose period would be ⅓ that of Mimas. Otto W. von Struve proved that the total mass of the rings could not exceed 1/27,000 that of Saturn.

Saturn possesses nine satellites: the discovery of the tenth, to which the name Themis was given, has not been confirmed. The largest, Titan, was discovered by Huyghens in 1655; four more were found by Cassini in that century. Sir William Herschel discovered the two nearest the planet in 1789. The eighth was found in 1848 by George P. and William C. Bond at Harvard and William Lassell in Europe two days later. William H. Pickering discovered the ninth, by photography, in 1898. This is called Phoebe. Titan alone is larger than the Moon, being 2,600 miles in diameter, and 1.86 times as massive. It is the only satellite in the solar system on which traces of an atmosphere have been found. This was done by Gerard Kuiper in 1944 at the McDonald Observatory, University of Texas, using the great 82-inch reflector. Bands of methane were detected; ammonia was possibly present. The other satellites showed no traces of atmospheres, but it would not have been expected due to their much smaller masses. That Titan can hold an atmosphere while the four approximately equally massive satellites of Jupiter cannot is due to the fact that the Sun's heat at Saturn's distance is so much less, hence gaseous molecules have a lower velocity. Then a certain gravitational force on Titan could retain them while an equal force upon Jupiter's satellites could not. Eight satellites have direct motion; the outer one, Phoebe, has retrograde motion. This last is perhaps 150 miles in diameter and its period is 546 days, its orbit being inclined about 149° to the planet's equatorial plane. Seven of the other satellites lie almost in the latter plane, which is also that of the rings. The eighth alone, Iapetus, has an orbit inclined at 14°. As only Titan shows an appreciable disk, the diameters of the other satellites have to be estimated indirectly by means of their apparent brightness. This means that there is considerable uncertainty in the volumes and, as mass equals volume × density, the densities are also quite uncertain. As for the masses, in five of the nine cases they have been computed through perturbations; the results for the other four are less certain. However, using such data as we have, a density less than that of water is indicated for some of the satellites. It is very difficult to see how a body in the presumed condition of a satellite can have a density of less than one, namely, that of water. In the case of Phoebe, as for Jupiter's outer satellites, we might possibly think of captured nuclei of comets, but such an explanation would hardly

Name	Mean distance from Saturn in radii of planet	Periodic time d h	Discoverer	
Mimas	3.1	0 23	W. Herschel	1789
Enceladus	4.0	1 9	W. Herschel	1789
Tethys	4.9	1 21	J. D. Cassini	1684
Dione	6.3	2 18	J. D. Cassini	1684
Rhea	8.8	4 12	J. D. Cassini	1672
Titan	20.5	15 23	C. Huyghens	1655
Hyperion	24.8	21 7	W. C. Bond	1848
Iapetus	59.7	79 8	J. D. Cassini	1671
Phoebe	216.8	546	W. H. Pickering	1898

be tenable for the inner, more regular satellites. All nine seem to keep the same face towards Saturn. Iapetus, however, is five times brighter at western than at eastern elongation. This means probably an enormous difference in reflective power on opposite sides of its central meridian, because a body of its size, about 1,100 miles in diameter, would almost certainly be nearly spherical in shape. Five of the remaining satellites have been observed to vary slightly in brightness. The same explanation as that given for Iapetus would apply to them. The *American Ephemeris* and the *Nautical Almanac* give a diagram of the satellite system and full data as to their elongations, conjunctions, and other information necessary to identify them on any given date.

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SATURNALIA, the name of a Roman festival, instituted, according to the popular belief of the ancients, in commemoration of the happy period under the reign of Saturn, when freedom and equality prevailed, and violence and oppression were unknown. It originated probably as a harvest celebration. The festival continued at first one day; then three; afterward five; and finally, under the Caesars, seven days, namely, from the 17th to the 23d of December. At the commencement of this festival a great number of wax tapers were lighted in the temple of Saturn, as a sign that no more human victims were to be sacrificed. During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday, to commence war was impious and to punish a malefactor involved pollution. The slaves were freed from restraint, wore caps as badges of freedom and went about dressed in tunics, adorned with purple, and in white togas. Masters and slaves changed places; and while the servants sat and banqueted at the tables, they were waited on by their masters and their guests, who, if they did not do this, were obliged to submit to all sorts of ridiculous punishments. Jests and freedom everywhere prevailed; and all ceased from their various occupations.

SATURNIAN VERSE, a metre employed by the earlier Roman poets. It consists of two members; the first an iambic dimeter catalectic, the other a trochaic dimeter brachy-catalectic. It points to the transition from the accentual versification of Etruria and Latium to the quantitive verse of fully developed Roman literature modeled as this latter was on Greek usage. It was originally employed in the hymns to Saturn sung at harvest time, hence its name; and it is also found in extant fragments of Naevius, Livius Andronicus, Ennius, etc. The basis of the metre is thus shown:

which corresponds with the metre of the old jingle,

There was a man in our town | wondrous wise and cunning.

The metre is met with in all primitive forms of European poetry, whether Spanish, German, or Anglo-Saxon, and is the underlying measure for almost all ballad literature.

SATYRS, săt'ẽrs or sā'tẽrs, in Greek mythology, a race of woodland divinities, who were followers of Dionysus (Bacchus), and represent the luxuriant vital powers of nature. They are not mentioned by Homer, but Hesiod describes them as a worthless race, unfit for work. They were supposed to be the sons of Hermes (Mercury) and Iphthima, or of Silenus. They appear in early works of art and poetry as robust in human frame with bristly hair, broad snub-noses, ears large and pointed like those of animals, two little horny knobs on their foreheads and a tail like that of a horse or goat. They are described as being fond of wine (whence they frequently appear with a wine cup or a thyrsus in their hands), and of every kind of sensual gratification, whence they are often represented sleeping, playing musical instruments, or engaged in voluptuous dances with nymphs. Like all the forest and field deities, they were greatly dreaded by mortals. By later writers, especially the Roman poets, the satyrs are confounded with the Italian Fauns, and are accordingly represented with larger horns and goats' feet, although they were originally quite a distinct class of beings. Ancient sculptors were fond of representing the satyr whether in his coarser or finer type—one of the most famous specimens of Greek art being the Satyr of Praxiteles, in which the revolting animal features of the conception have disappeared, and the satyr is portrayed as a beautiful and graceful youth.

SAUCONITE, a zinc-bearing clay from mines at Friedensville, Pa.

SAUDI ARABIA, a kingdom occupying most of the Arabian Peninsula. Approximately 865,000 square miles in area, Saudi Arabia is bounded on the north by Jordan, Iraq, and Kuwait; on the east by the Persian Gulf; on the south by various British protectorates and Yemen; and on the west by the Red Sea. Population estimates are unreliable, but perhaps the best (1950) are: total population, 3,500,000; Hofuf, 90,000; Mecca, 60,000; Riyadh (the capital), 55,000; Jidda 40,000; Medina, 30,000.

Topography.—A coastal plain averaging 25 miles in depth extends along the east coast. Inland, paralleling the plain and rising sharply, are the mountains of Hejaz, with an average elevation of about 4,000 feet. To the east is the central plateau which slopes gently toward the Persian Gulf, though it is broken by several escarpments. East of the escarpments is the Dahna sand belt which extends for 800 miles (average width 35 miles, average height 1,500 feet) and links the al-Nufūd Desert with the Empty Quarter. The area north of al-Nufūd is largely a southern projection of the Syrian Desert. East of the Dahna is a low plateau (average width 100 miles, average height 800 feet) which merges with the low-lying Persian Gulf coastal region. Of the great sandy deserts, which occupy more than one third of Saudi Arabia, the Empty Quarter (area 250,000 square miles), which is relatively unexplored and almost uninhabited, is the largest. Al-Nufūd, though much smaller (area 22,000 square miles), is its northern counterpart.

Natural Resources.—Deficient rainfall and lack of rivers have hampered vegetation in Saudi Arabia, but dates (a chief item in the diet), and a variety of grains, fruits, and vegetables are cultivated where water supplies are adequate. Scattered trees, including the tamarisk and the acacia,

are also found. Natural fauna include the gazelle, oryx, jerboa, wolf, fox, wildcat, jackal, monkey, bustard, hawk, and various lizards and snakes. Camels, sheep, horses, and donkeys are domesticated. The most important minerals are the oil of Hasa and the gold of Hejaz.

People.—The overwhelming majority of inhabitants are Arabic-speaking Sunnite Moslems, and there are almost no linguistic or religious minorities, although some oases in Hasa have Shi'ite majorities. Religiously the dominant force is Wahhabism (q.v.). The basic cleavage is that between sedentaries and nomads (Bedouins). The former are farmers or merchants; the latter are tribal herders, who, in a parched land, must move around, usually within traditional tribal areas, to find sufficient pasturage. There has not been any industrial class in the past, but the 17,000 employees (1950) dependent on the Arabian American Oil Company (Aramco) constitute the nucleus of one. Traditionally Bedouins and sedentaries have been hostile, despite the fact that most of the latter preserve tribal affiliations. There are, of course, social gradations within each group. The family is very closely knit; however, women are secluded and take no public part in affairs.

Government.—Prior to the conquest of Hejaz, Saudi affairs were handled patriarchically by the ruler, on whose absolutism Moslem law, unwritten tribal law, and custom are still the only checks. Thereafter, however, the complexities of administering the pilgrimage to the holy cities (Mecca and Medina, qq.v.) and fulfilling international obligations necessitated a more formal administration. Accordingly King 'Abd al-'Azīz II promulgated (Aug. 29, 1926) a "constitution" for Hejaz, according to which Hejaz was linked to Nejd through the king, sovereignty was vested in Moslem law, and governmental norms were based on early Islam. Administration devolved on a viceroy nominated by the king. Provision was made for a consultative legislative assembly, nominated by the king, as well as for local councils. The apparent dualism between Hejaz and Nejd was overcome partially by unifying them as Saudi Arabia in 1932. Nejd is administered by the royal court; the governor of Asir is supervised by the viceroy of Hejaz; Hasa is hereditarily governed by a collateral branch of the royal family. A month before his death 'Abd al-'Azīz II established the first Saudi cabinet, though reserving veto powers. Instead of the expected fragmentation at his death, improved communications and various developmental schemes have reduced separatist tendencies.

Economic Factors.—Before the discovery of oil Saudi economy was of a non-self-supporting type in which sedentary and nomad exchanged their specialties. Manufactured goods and some basic foodstuffs were imported. The greatest single source of income was the pilgrimage, which gave Hejaz economic as well as spiritual ascendancy over other provinces.

With an American company's discovery of oil in Hasa the situation changed radically. Not struck in commercial quantities until 1938, oil production has increased rapidly since then (1951: 850,000 bbls./day) and royalty payments have more than kept pace (1951: $125,000,000). Aramco, with proven reserves of nine billion barrels, is (1952) the world's largest producing company. Aside from royalties the country received approximately $10,000,000 in wages and other ramifications of the industry in 1951. Furthermore, Aramco stimulates independent contractors and conducts development schemes for the government.

The pilgrimage is still an important source of income, netting approximately $6,00,0000 annually in fees, transportational charges, and purchases. Taxes and duties account for perhaps 5 per cent of the total revenue, and several hundred thousand dollars accrue annually from Hejazi gold mines.

Communications.—The only functioning railroad is that from al-Dammām to Riyadh, completed in 1951. Surfaced roads are also deficient, being limited to Hejaz and Aramco's operational area in Hasa; unimproved tracks link other parts of the country. However, 9,000 motor vehicles were licensed in 1948. The important cities are served either by international or by Saudi Arabian airlines. Ocean vessels call at Ra's Tannūrah, al-Dammām, and Jidda. International telegraph services are available at Jidda, and both the government and Aramco maintain internal radio communications; there are two government broadcasting stations. Telephones were estimated to number 2,500 in 1946.

History.—Since its inception Saudi power has been based on a fusion of Wahhabism and Saudi family leadership. When Muḥammad ibn-'Abd al-Wahhāb (d. 1793), the founder of the puritan Wahhabi doctrines, began to advocate reform in his native Nejdi town, he was expelled, but Muḥammad ibn-Saud (r. 1744–1765), ruler of neighboring al-Dir'īyah, received the reformer. Politically the main concern of the two Muḥammads was expansion. Sometimes this was possible through conversion; in other cases force was necessary. Muḥammad ibn-Saud died in 1765 even before central Nejd was secured, but under his son, 'Abd al-'Azīz (r. 1765–1803) the state quickened its pace as follows: 1788, Nejd under control; 1789–1790, Hasa occupied; 1801, pillaging of Karbalā' in Iraq, Oman pays tribute; 1803, Mecca temporarily occupied.

Assassinated in 1803, 'Abd al-'Azīz was succeeded by his son, Saud (r. 1803–1814), who intensified the campaign against Hejaz, nominally under Ottoman control, and completed it in February 1806, when Mecca fell. By 1811 the empire controlled all the peninsula, save Yemen and Hadhramaut, as well as the steppe encircled by the Fertile Crescent. The situation, in fact, had become so alarming that the Porte ordered the Egyptian viceroy, Muḥammad 'Ali, to destroy the desert upstart. After a protracted struggle (1811–1818) the Egyptians, aided by the death of Saud (1814), succeeded. Saud's son, 'Abdullāh (r. 1814–1818), a less able commander, was captured and beheaded.

An Egyptian occupation, marked by growing resistance, continued sporadically until 1840, when international events forced its withdrawal. Among various members of the Saud family struggling to reconquer the country, Turki (r. 1823–1834) and his son Faiṣal (r. 1834–1838, 1843–1867) emerged victorious. After 1843 Faiṣal restored Wahhabi control in Nejd, Hasa, and Oman, but Hejaz reverted to Sherifian control until 1925. Moreover, Faiṣal's reign saw the rise of his vassals, the ibn-Rashīds of Ḥā'il, to semi-independence.

Faiṣal's death inaugurated a period of internecine warfare between his sons, 'Abdullāh and Saud, resulting in Ottoman occupation of Hasa

(1871) and the emergence of the ibn-Rashids as the chief power of inner Arabia. The greatest Rashīdi ruler, Muḥammad (r 1869–1897), brought all Nejd under his power by 1887 When Abdullāh died (1889) Saudi leadership passed to Faiṣal's third son, 'Abd al-Rahmān, but Saudi authority was completely eliminated in 1891, when he was forced to flee into exile with his young son, 'Abd al-'Azīz.

'Abd al-'Azīz and his father settled in Kuwait, where the young man nourished the ambition of restoring his patrimony. This ambition was rewarded when on January 16, 1902 he and a small hand-picked force captured Riyadh. Ibn-Rashīd, preoccupied by a campaign against Kuwait, delayed action until autumn. When he finally moved, ibn-Saud, as he became known, defeated him. Indecisive hostilities continued for the next four years, but in April 1906 Rashīdi power, as an active threat to the new Saudi state, was broken by a decisive Saudi victory, in which ibn-Rashīd was killed. His successors were thereafter confined to northern Nejd, leaving the center and south to ibn-Saud.

In June 1912, ibn-Saud gave some ground to the Meccan Sherif, Hussein, in order to gain time for dealing with Bedouin unrest. His answer to the Bedouin problem was the *Ikhwān* (brethren) movement, whereby he settled Bedouins in fixed communities, hoping thus to acquire a military force loyal to state instead of tribe. He also increased Wahhabi propaganda.

On the eve of World War I, ibn-Saud took another step forward by conquering (April 1913) Hasa from the Ottomans. Coming thereby into close contact with the British, he encouraged them vis-à-vis the Turks, who supported his Arabian enemies. On December 26, 1915 the situation constrained him to sign an agreement which in effect established a British protectorate over his dominions, for it granted him a British subsidy and made negotiations with other powers conditional on British consent. The Wahhabi state took little active part in the war, especially after June 1916, when Sherif Hussein's revolt against the Turks gained him generous British support.

In 1919 the uneasy wartime Arabian truce was broken by Hussein, who attacked the western edge of Wahhabi territory. His army was destroyed, thus opening the way to Mecca, but ibn-Saud contented himself with slight territorial gains. However, he soon acquired other territories. In 1920 he annexed the inland districts of Asir and in the following year conquered the Rashīds for good. The last victory was consolidated in 1923 by occupying other districts north and west of Ḥā'il.

A decision between ibn-Saud and Hussein was not long postponed despite British mediation. The immediate spark was Hussein's presumptuous assumption of the caliphate in March 1924. Hostilities began in September with the fall of al-Ṭā'if to a Wahhabi detachment. Hussein's army tried to halt the Wahhabis between al-Ṭā'if and Mecca, but was defeated and retired to Jidda. The Meccans then forced him to abdicate in favor of his son, 'Ali, and surrendered without resistance. The rest of the war consisted mainly of siege operations, in which starvation was the chief Saudi weapon. Medina capitulated on December 5, 1925. 'Ali abdicated on the 19th, and four days later ibn-Saud entered Jidda. With the conquest of Hejaz, ibn-Saud's expansion was almost complete. In 1926 lowland Asir, previously independent, was added to his realm by treaty. In 1934 a boundary dispute caused war between Saudi Arabia and Yemen. Ibn-Saud won, but with characteristic tact only occupied the disputed territory. His most serious internal crisis was in 1928 when he had to contend with a revolt of the Muṭair and 'Utaybah tribes.

Ibn-Saud's growing power brought him international recognition. On May 20, 1927 a treaty between Britain and Hejaz annulled the agreement of 1915 and declared the absolute independence of ibn-Saud. Other countries followed suit.

Since 1934, Saudi Arabia has known only peace and security. During World War II she played no active role, but the king's staunch loyalty to the Allies was a real factor when the issue hung in the balance. In the international field Saudi Arabia is a charter member of both the United Nations and the Arab League. The founder of modern Saudi Arabia died Nov. 9, 1953, and was succeeded by his oldest living son, Saud. Aramco has put into effect development projects which are changing the whole face of the country. The most important are: increased supplies of water for irrigation; installation of municipal water supplies; experimental farms; extension of educational and medical facilities; new piers at Jidda and al-Dammām to eliminate lighterage; and electrification of Jidda, Mecca, and Riyadh. Further, a whole new field for private enterprise is opening, wherein new enterprises include: construction, transport, tanning, and power companies; brick, textile, soap, ice, and cement plants; machine and carpentry shops; service stations; hotels; laundry and dry cleaning establishments; cold-storage plants; chicken farms; and a bank. These novelties may create tensions in the future, but Saudi Arabia has made a definitive break with the past.

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SAUGER, or **SAND PIKE**, a fish of the rivers and lakes of the northern Mississippi Valley, a pike-perch of the genus *Stizostedion*, and hence a relative of the wall-eyed pike. The sauger (*S. canadense*) is much smaller than the wall-eyed pike, seldom more than 18 inches long and one to two pounds in weight. It varies in quality and estimation both as food and as a game fish, but in some tributaries of the upper Mississippi affords good sport by trolling over ripples with a minnow. Its color is olive gray, the sides grassy or orange with dark mottlings, round black spots on the dorsal fins and a large black blotch on the base of the pectoral fin.

SAUGERTIES, sä'gėr-tĭz, N. Y., village in Ulster County, alt. 100 feet; on the west side of the Hudson River at the mouth of Esopus Creek; on the West Shore Railroad; by rail, 100 miles north of New York City, 11 miles north of Kingston. The surrounding country is agri-

cultural, with mountains back from the river. Nearby are quarries of bluestone and limestone; Saugerties was at one time an important shipping point for these stones. It was also an important port of call in river traffic. Papermaking is the village's principal industry. Several plants engage in the manufacture of women's dresses and waterproof goods.

History.—Saugerties was settled in the early 1700's, and incorporated in 1831. The name is said to come from the Dutch "de zaagertzje's," meaning "the sawyer's," and was applied to a man who owned a sawmill on the site before 1700. Several houses in the village date back to the 18th century; the Kiersted house, for example, was built in 1727. The government is administered by a mayor and board of 6 trustees. Pop. (1940) 3,916; (1950) 3,907.

SAUGUS, sâ'gŭs, town, Massachusetts, in Essex County, altitude 20 feet; 10 miles northeast of Boston; on the Boston and Maine Railroad. It is a residential town with few industries. The first successful iron works in America was established here in 1644. It is now being restored by the Steel Institute as the birthplace of the industry in America. Many of the original foundations have been located by archaeological excavations. Among these are the blast furnace, portions of the old water wheel, the refinery and the 500-pound hammer. The Old Ironworks House (1643) has a framework of English oak timbers brought over by the builder. The town, originally called Hammersmith, was settled in 1630 and incorporated in 1815. Pop. (1940) 14,825; (1950) 17,162.

SAUL, first king of Israel from about 1040 B.C. He was the son of Kish, a wealthy and powerful Benjamite, was noted for his personal beauty and courage; and when the people became dissatisfied with the theocratico-republican constitution, was selected by Samuel for their king. He was not acknowledged by the whole people until after he had gained a victory over the Ammonites. Repeated successes over the Philistines, Edomites, Moabites, Ammonites, and even over a king beyond the Euphrates, confirmed his authority. But Samuel, offended by the encroachments of the king on the privileges of the priesthood, and by his disobedience to the commands of Jehovah in a war against the Amalekites, secretly anointed David as king. His reign was terminated by a catastrophe. A battle was fought against the Philistines at Mount Gilboa; the Hebrews fled, Jonathan and two other sons of Saul fell and the king slew himself with his own sword. David, whose skill in poetry equalled his musical genius, honored in a touching elegy the memory of his fallen friends and foes (II Samuel 1), who, "lovely and pleasant in their lives, were even in their death not divided; they were swifter than eagles, they were stronger than lions."

SAUL. This "dramatic lyric" by Browning, one of the most popular of his poems, is founded on I Samuel 14:14-23, which tells how David by playing upon his harp exorcized the king's evil spirit. The first nine stanzas of *Saul* were published in 1845; to these were later added seven stanzas, and the entire poem was published in 1855. Its noble and inspiring outlook on life, its profound emotional appeal, its fine imagery, its dramatic quality and the vigorous rush of its verse, place *Saul* among the most remarkable of English lyrical poems. David is the speaker. As he and his friends are tending their sheep in the morning, he tells the story of the night when he sang and played before Saul. He finds the king in his tent, apathetic and almost unconscious. Saul must be aroused, made to feel the joy of life, quickened to a sense of his own personal worth. First, David plays the tunes to which the wild animals respond—the quail, the crickets, the jerboa; then, the tunes associated with simple human customs, the reaping, burying, marrying and worshipping. Saul begins to respond. David then sings the joy of living, of "our manhood's prime vigor" and of Saul's great place in the world. The king's spirit is roused; but the harpist must lead him far higher. So he sings of fame after death, of the place Saul shall hold in the memory of generations yet unborn; finally, of immortality and love, and of the Christ as the living embodiment of man's highest longings. Saul is restored. As the singer hastens homeward through the night, he receives nature's own attestation of the new law of love. Much of Browning's philosophy of life is embodied in *Saul,* which contains ideas that also find expression in others of his shorter poems, notably in *Abt Vogler* and *Rabbi ben Ezra.*

MARION TUCKER.

SAUL, a Biblical tragedy in five acts, by Vittorio Alfieri (1749–1803), is generally regarded as his masterpiece. It is written in blank verse, or, rather, in unrhymed hendecasyllables, broken and varied, thus avoiding the monotony of the French Alexandrine verse which the author disliked. Alfieri, as he relates in his *Vita* (Autobiography, Epoca IV, Cap. 9), had been reading with intense interest the Bible during a quiet stay in Rome (1782–1784), and had his imagination enkindled by the fierce struggle between two opposite passions in the breast of Saul. Thus the idea of the tragedy came to him on March 30, 1782; and by July 30 the play was finished. Alfieri would have dedicated *Saul* to Pope Pius VI (Jean-Ange Braschi), but His Holiness thought it would be unbecoming to be associated in any way with a theatrical production. (*Vita,* 1783).

The tragedy was first performed in Florence, in 1793, by amateurs, in a private house before a small audience, with good success. *Saul* is representative of Alfieri's genius, and has had the most constant success of all his tragedies on the stage. The superb tragic elements in the Biblical story have long made it a favorite for treatment by poets, sculptors, painters and musicians—witness *Saul le furieux* of Jean de la Taille, the *Saul* of Voltaire, and of A. Soumet, in France, of Paul Heyse and J. G. Fischer, in Germany, and of Aaron Hill, in England, and of Charles Heavysege, in America.

In extreme simplicity of structure *Saul* is like the author's other tragedies yet is less austere, in that humanity here reveals itself more pleasingly. While Alfieri sympathized with Saul in his conflict with the priesthood, that struggle does not form the main interest of the play; nor is David, the instrument of God, at all like the tyrants who represent the opposition in most of Alfieri's tragedies, but on the contrary he grows throughout the plays in nobility, loyalty and tenderness. Saul, a prey to conflicting emotions, perishes not because of his crimes or passions, but through remorse, intensified by the terror which has taken posses-

sion of his soul. The *Song of David* in the third act is one of the gems of Italian lyric poetry. A useful edition of *Saul,* well annotated, is that of Mario Menghini (Florence 1893).

JAMES GEDDES, JR.

SAULSBURY, Willard, American lawyer and legislator: b. Georgetown, Delaware, April 17, 1861; d. Feb. 20, 1927. He was educated at the University of Virginia, was admitted to the bar in 1882, and until his death practiced in Washington. He came of a family prominent in Democratic political circles in Delaware, was delegate at large from Delaware at the Democratic National conventions in 1896, 1904, and 1912. He was United States senator in 1913–1919, afterward returning to private life. He consolidated the street and electric railroads of Wilmington, and was director in various banks and trust companies.

SAULT SAINTE MARIE, city, Michigan, and Chippewa County seat; altitude 607 feet; on St. Marys River and on the Sault Sainte Marie Ship Canal, between Lakes Superior and Huron; 502 miles northeast of Minneapolis, Minn.; on the Canadian Pacific; Minneapolis, St. Paul and Sault Ste. Marie (Soo Line); and Duluth, South Shore and Atlantic railroads; has airline service. It is a port of entry in the 38th customs district. The city has ferry service to the city of the same name across the river in Ontario; and here a railroad bridge spans the river. The Michigan city is surrounded by an agricultural area, in which dairying and stock raising are carried on; its industries are concerned with leather and carbides, woolen goods, and beverages; and there are fisheries. There are also lumber yards and warehouses, and facilities for ship construction and repair. Hydroelectric power is developed from the descent of the river which drops 20 feet in one mile. The locks in 1948 took care of 113,523,588 tons of freight; it is said that more tonnage passes through Saint Marys Locks than through the Manchester, Suez and Kiel Canals combined. (See SAULT SAINTE MARIE CANALS.)

The city of Sault Sainte Marie has a Carnegie public library, and a marine library, good public schools, churches of many denominations, a county hospital. There is also a community building, a municipal tourist camp, two parks, and a high school athletic field. A point of interest is the home of Henry Rowe Schoolcraft (q.v.), the American ethnologist and Indian student, who had headquarters here in the 1820's. The locality has a romantic place in United States and Canadian history; and even before that it must have been a well known passing point on Indian trails. Etienne Brulé landed on the site in 1618 when Champlain sent him to find a Northwest Passage. Other explorers followed, and the Jesuits established a mission here in 1668 under Father Jacques Marquette. The French held a great council of the Indians here in 1671, and proclaimed France as owner and ruler of all the lands south to the Gulf of Mexico and west to the Pacific Ocean. The Stars and Stripes first flew over the settlement in 1820 when Gov. Lewis Cass (q.v.) claimed the region for the United States. The city was incorporated in 1887. It has commission-manager government. Pop. (1940) 15,847; (1950) 17,912.

SAULT SAINTE MARIE, city, Ontario, Canada, in the Algoma district on the St. Marys River through which Lake Superior empties into Lake Huron and which here constitutes the boundary between Ontario and northeastern Michigan. The historic "sault" above the city—barrier to the early fur trade—has a drop of 20 feet in less than a mile. Opposite the Canadian city is its still more historic namesake the city of Sault Ste. Marie the oldest site of settlement in the state of Michigan. The two are connected by a mile-long international bridge and by ferry service. The port of Sault Ste. Marie handles a considerable local trade, the number of arrivals in the coasting service being 380 in 1950 and in the service 554; coal and iron ore were the chief foreign products unloaded, and pig-iron and coke the chief products loaded for foreign destination.

History.—As the meeting place of the three largest of the Great Lakes, the neighborhood of Sault Ste. Marie was frequented from the earliest times by the Indians attracted by the lake fisheries, and by the explorers, fur-traders and missionaries of New France, including among the latter such famous names as Brulé and Nicolet, Jogues and Raymbault, Marquette and Joliet, La Salle, Radisson, and Groseilliers. There was a mission on the American side of the river as early as 1641, and a permanent settlement as early as 1662. The North-West Fur Company established a post on the Canadian side in 1783 and built a lock around the rapids in 1797–1798, which was destroyed in 1812. Sault Ste. Marie became the center of the Algoma district in 1858, was incorporated as a town in 1887 and as a city in 1912. Pop. (1941) 25,794; (1951) 32,273.

SAULT SAINTE MARIE CANALS, sōō′ sānt mȧ-rē′, or French sō sănt mȧ-rē′ (also ST. MARYS FALLS, or "Soo," CANALS). The St. Marys River, 63 miles long, is formed by the flow of water from Lake Superior to Lake Huron; the level of the former being 23 feet higher than the latter. This river is the boundary between Ontario, on the north and east, and the Upper Peninsula of Michigan, on the south and west.

The early trappers and traders of the northwest found that the sault, or falls (actually rapids), of the St. Marys, where the descent is about 18 feet in one mile, made free navigation impossible and forced them into portaging the ever-increasing cargoes of furs and merchandise at this point, about 49 miles above the river's mouth. Finally the Northwest Fur Company constructed a canal with a single lock on the Canadian side. This lock, built in 1797–1798, was 38 feet long, 8 feet 9 inches wide, with a lift of 9 feet. The canal was in use by canoes and bateaux until 1814, when all but the timber floor and sills of the lock were destroyed by United States troops during the War of 1812.

No further attempts at canal building in this remote spot were made until 1853, when a ship canal—the first within the borders of the United States—was begun by the State of Michigan on land granted by the federal government. It was completed in 1855. The length of this canal was 5,674 feet, and it was provided with two locks in tandem, each being 350 feet long and 70 feet wide, with 11½ feet of water on the sills and a lift of 9 feet. The original cost was $999,802.

Tolls, starting with six and a half cents per registered ton and being gradually reduced to two and a half cents, were collected until 1881, when

the canal was transferred to the federal government, on June 9. In 1870 with the consent of the state, the federal government had begun to enlarge the canal, and by 1881 had increased its length to 1.6 miles, its width to an average of 160 feet, and its depth to 16 feet. Another lock, the Weitzel Lock, located 100 feet south of the state-built locks, was completed in 1881. This single lock was 515 feet long, 80 feet wide (60 feet at the gates), and had a depth of 17 feet on the sills. The cost was $983,335.

In 1888 the state-built locks were torn down and replaced by the Poe Lock, 704 feet long, 95 feet wide in the chamber, with 21 feet of water on the sills. The Poe Lock was completed at a cost of $2,837,337, and was opened in 1896.

A Canadian canal was opened in 1895. This is 1.4 miles long, 150 feet wide, and 22 feet deep, with a lock 900 feet long, 60 feet wide, with 22 feet of water on the miter sill. The Canadian canal is also toll-free. See CANADIAN CANALS.

The third and fourth locks on the United States side are the Davis and the Sabin, which were built in 1907–1919. These locks have the same dimensions, 1,350 feet long, 80 feet wide, with 23 feet of water on the miter sills at low-water datum. Their combined cost was $4,680,700. A separate and free waterway was also constructed to feed these locks.

In 1942 the Weitzel Lock was torn down to make way for the MacArthur Lock, which was opened in 1943. The MacArthur Lock cost about $12,706,000, and is 800 feet long, 80 feet wide, with 31 feet of water on the miter sills at low-water datum.

Beginning with a congressional appropriation of $100,000 in 1856, large sums have been spent on deepening and widening the channel, eliminating short turns, and on other measures to permit the passage of larger ships and to speed their transit. As a result 47 miles have been dredged, with a minimum width of 300 feet for one-way traffic and 600 feet for two-way traffic. The channel for traffic to Lake Superior has a minimum depth of 21 feet; the channel to Lake Huron, 25 feet.

It is not generally realized that the Sault Sainte Marie canal system, considered in terms of the traffic carried, in net tons, is the most important waterway in the world; exceeding the Suez, Panama, and Kiel canals combined. Bulk cargoes, which can be most cheaply transported by water, are naturally the leading source of traffic. Iron ore and grain, destined for the industrial centers of the United States and Canada, have long been the staples of the trade from Lake Superior, although petroleum, brought by pipeline from Canadian fields to the shores of the lake, has assumed a considerable importance. The traffic from Lake Huron consists chiefly of coal, other bulk goods, and general merchandise.

SAUMAREZ, sō'mà-rĕz(?), sō-mà-rā'(?), **James,** BARON DE SAUMAREZ, British naval officer: b. St. Peter Port, Guernsey, March 11, 1757; d. Guernsey, Oct. 9, 1836. He entered the navy in 1770 and served in America during the Revolutionary War. He was raised to the rank of commander after distinguishing himself in the engagement with the Dutch on Dogger Bank, Aug. 5, 1781, and was captain of the *Russell* in Admiral George Rodney's victory over the French off Dominica, April 12, 1782. In 1793 he was knighted for the capture of the French frigate *Réunion.*

In March 1795 Saumarez was appointed to the command of the *Orion,* which took part in the battle with the French off L'Orient on June 23 and the victory over the Spanish fleet off Cape St. Vincent, Feb. 14, 1797. He was senior captain under Horatio Nelson in the same ship at the Battle of the Nile, Aug. 1–2, 1798. In 1801 he was made rear admiral, created a baronet, and appointed to the command of a squadron cruising off Cádiz. Driven off with the loss of a ship in an attack on French ships at Algeciras, July 6, 1801, he routed the latter and a Spanish squadron at sea on July 12. He was made vice admiral in 1807 and from 1809 to 1813 commanded a squadron in the Baltic. He was made admiral in 1814 and in 1831 was created baron de Saumarez.

SAUMUR, sō-mür', commune, France. It is situated in the Department of Maine-et-Loire, 28 miles southeast of Angers, on the Loire, with a suburb on an island in that river. Saumur is noted for the French Army cavalry school located on its northwestern outskirts in 1768. The town grew up under the protection of the château of the counts of Anjou on a prominence above it. This castle was built in the 11th–13th centuries, but was much altered in the 16th. The town has several churches dating from the 11th and 12th centuries, although subsequently altered or added to; its town hall dates from the 16th century, and there are numerous houses from the 15th to 17th centuries.

Saumur became a Protestant stronghold in the 16th century, and declined after the revocation of the Edict of Nantes in 1685, when many inhabitants emigrated. About a third of the town was destroyed in 1940, when the cavalry school cadets resisted the German invasion. Manufactures include sparkling white wines, jewelry, and machinery. Pop. (1946) 17,635.

SAUNDERS, sän'dĕrz, **Alvin,** American public official: b. Fleming County, Ky., July 12, 1817; d. Omaha, Nebr., Nov. 1, 1899. He moved with his parents to Illinois in 1828, and at 19 went to Iowa, where he later became postmaster at Mount Pleasant. In 1846 he was a member of the convention which framed the constitution under which Iowa was admitted to statehood, and in 1860 was chairman of that state's delegation to the Republican convention which nominated Lincoln for the presidency. Saunders was appointed governor of the Territory of Nebraska by Lincoln in 1861 and retained that post until 1867, when the territory was admitted as a state. He served as United States senator from Nebraska from 1877 to 1883.

SAUNDERS, SIR **Charles Edward,** Canadian wheat expert: b. London, Ontario, Feb. 2, 1867; d. Toronto, July 25, 1937. He was the son of William Saunders, founder of the Dominion experimental farms. He was educated at the University of Toronto and at Johns Hopkins University, and in 1903 was appointed Dominion cerealist at the experimental farms of Ottawa, retaining a connection with the Dominion experimental farms until his retirement in 1922. During this period, as one of a group originally directed by his father, he discovered the Marquis, Ruby, Garnet, and Reward varieties of wheat. Saunders was elected a fellow of the Royal Society of Canada in 1921 and in 1925 was awarded the society's Flavelle Medal. He was knighted in 1933. Saunders was the author of *Essais et vers* (Montreal 1928), as well as of reports and bulletins in official and

other publications. He was made officer of instruction by the French government and was awarded the French Academy Medal. He was a fellow of the Royal Society of Canada.

SAUNDERS, Richard, the name under which Benjamin Franklin published his 'Poor Richard's Almanac' (1732–57).

SAUNDERS, Thomas Bailey, English author: b. Cape Colony, 2 Dec. 1860; d. 8 Feb. 1928; was educated at King's College, London, and at University College, Oxford, became a barrister in 1886 and then engaged in literary work. He first made translations of much of the work of Schopenhauer and Goethe and has written 'Life and Letters of James McPherson' (1893); 'The Quest of Faith' (1899); 'Prof. Harnack and His Oxford Critics' (1902); 'Schopenhauer' (1901), etc.

SAUNDERS, William, Canadian agriculturist, pharmacist and entomologist: b. Devonshire, England, 16 June 1836; d. 13 Sept. 1914. He accompanied his parents to Canada in 1848 and became a manufacturing chemist at London, Ontario. Becoming extensively interested in agriculture, he made a study of soils and insect pests, and did much to further the development of scientific agriculture in Canada. He was professor of materia medica at Western University in 1882–85 and public analyst for western Ontario in 1882–86. He was one of the founders of the Ontario College of Pharmacy and served as its president for two years. In 1885, under government direction, he investigated agricultural experiment work in the United States and Europe, his report resulting in the establishment of the Canadian experiment farms, of which he was in charge in 1886–1911. He was a founder of the Ontario Entomological Society, and was one of the original fellows of the Royal Society of Canada, of which he was president in 1900. Author of 'Insects Injurious to Fruit' (1882; 2d ed., 1898).

SAUNDERS, William Lawrence, American engineer and inventor: b. Columbus, Ga., 1 Nov. 1856. He was graduated at the University of Pennsylvania in 1876, and in 1878–81 he was with the National Storage Company at Communipaw, N. J. He was afterward president of the Ingersoll-Sergeant Drill Company and an officer in other companies manufacturing tools and machinery. He invented a compressed air system of pumping liquids; a drill for use upon submerged rocks, and the Ingersoll track and bar channelers for quarrying stone. In 1915 he was appointed to the United States Naval Advisory Board and subsequently became its chairman. Author of 'Compressed Air Information' (1903); 'Compressed Air Production,' and joint author of 'Subways and Tunnels of New York.' Died, 25 June 1931.

SAUREL, a fish. See SCAD.

SAURIA, sâ'rĭ-ạ, a term variously applied in the classification of the reptiles, but in this work restricted to designate the subclass composed of the orders *Lacertilia* (lizards) and *Ophidia* (serpents). In popular speech the phrase "saurian reptiles" usually means alligators or crocodiles. See REPTILES.

SAURIN, Jacques, zhäk sō-răñ, French Protestant preacher: b. Nimes, 6 Jan. 1677; d. The Hague, 30 Dec. 1730. After study at Geneva he became pastor in 1701 of a Walloon congregation in London, but in 1705 went to The Hague to take charge of a church of French refugees assembling there in a chapel of the Prince of Orange. Here his pulpit oratory was so greatly admired that it roused the bitter envy of his clerical brethren, who charged him with heresy and subjected him to a series of petty persecutions which shortened his life. His doctrines were those of moderate Calvinism. As a pulpit orator he has been likened to Bossuet, and so far as vigor of presentation goes this may be thought just. He was the author of 12 volumes of 'Sermons,' selections from which were translated into English, and published between 1775 and 1784 in five volumes (with a 'Memoir'), a sixth being added in 1796. Among his other works are 'Etat du Christianisme en France' (1725); 'Abrégé de la théologie et de la morale Chrétienne' (1722); 'Discours sur les evénements les plus mémorables du vieux et du Nouveau Testament' (1720–28). Consult 'Life' by Berthault (1875).

SAUROPODA, sâ-rŏp'ō-dạ, a sub-order of dinosaurian reptiles which included gigantic forms, such as *Brontosaurus, Morosaurus, Diplodocus* and the like. (See DINOSAURIA). It is difficult, remarks Gadow, to understand how these huge, long-necked *Sauropoda* lived and moved about. The long neck suggests at first sight predaceous habits, but the teeth, rather feeble in *Diplodocus,* and distinctly of the plant-cutting type in other genera, put this out of the question. The high position of the impaired nasal opening, and the shortened nasal bones of *Diplodocus* are features indicative of aquatic habits, but the short-toed plantigrade limbs are absolutely adapted to terrestrial life, and we cannot well assume that such enormous brutes as *Atlantosaurus* could possibly have ventured into swampy ground.

SAUROPSIDA, a primary division of vertebrated animals, comprising the reptiles and birds, the other two corresponding divisions being the *Ichthyopsida* (fishes and amphibians) and the *Mammalia.* These divisions, set apart by Huxley, are in accordance with genetic relationships. For the similarities in structure between birds and reptiles, showing descent from a common sauropsidan ancestor, see ORNITHOLOGY; REPTILES.

SAURURÆ, the name given by Huxley to an order of the class of birds (see ORNITHOLOGY), constructed for the reception of *Archæopteryx* (q.v.), a fossil bird, the oldest and most primitive bird-fossil known, remarkable for its lizard-like tail.

SAURY-PIKE, or **SKIPJACK,** a fish (*Scomberesox saurus*), having a greatly elongated body covered with minute scales and the jaws prolonged into a long sharp beak. It is about 15 inches long, occurs plentifully on the north Atlantic coasts, frequenting inlets in shoals so dense that it may be taken in pailfuls. In order to escape the pursuit of the porpoise and large fishes it often leaps out of the water or skims rapidly along the surface. Consult Goode, 'American Fishes' (1888).

SAUSAGE, an article of food consisting of minced meat, highly seasoned, and enclosed in synthetic casings usually of cellulose.

Among the Romans the sausages of Lucania were held in high repute; they were made of fresh pork and bacon finely minced with nuts of the stone-pine, and flavored with pepper, cummin seed, bay leaves, pot-herbs and garum. The Bologna sausages of Italy are still highly prized; they consist of veal, salt beef, salt pork and bacon, finely chopped up, seasoned with sage, mixed herbs, ground pepper and mixed spice. The smoked sausages of Germany are also considered as a delicacy by many; they are made of fat and lean pork preserved for about a week by salt, saltpetre, black pepper and alspice being rubbed into the meat; it is then cut small and mixed with some shreds of shallot or garlic, pressed into an ox-skin, wrapped in a fold or two of muslin and then smoked in the same way as ham. The pork sausages of our own country are made and seasoned in various ways to please different palates. See MEAT PACKING; MEATS AND MEAT PRODUCTION.

SAUSSURE, sō-sūr, **Horace Bénédict de,** Swiss savant: b. Conches, near Geneva, 17 Feb. 1740; d. Geneva, 22 Jan. 1799. He began his studies in natural science in Geneva and at 22 was appointed professor of philosophy. Later he was elected member of the Council of Two Hundred in the new legislature of his country. His name has since become famous from his services to geology, geodesy, the geographical distribution of plants and the applied sciences. His most remarkable work was done in the investigation of plant anatomy. In pursuit of his chosen studies he traveled through France, Holland, England, Italy and Sicily; thoroughly exploring the Alps, especially the glaciers of Chamounix, and was the first to reach the summit of Mont Blanc (1787) and to measure its height by barometric pressure. He is also the inventor of the electrometer, hydrometer and similar instruments. As founder and president of the Society of Arts of Geneva he did good service to the industries of that city. Among his writings the most important are 'Voyages dans les Alpes' (1779) and 'Partie Pittoresque' (1890).

SAUTERNE, sō-tĕrn', a white Bordeaux wine of high repute, produced from grapes grown in the neighborhood of Sauternes, a village in the department of Gironde, near Bordeaux.

SAUVEUR, sō'vėr, **Albert,** American metallurgist: b. Louvain, Belgium, 21 June 1863. He studied at the Liége School of Mines, and, coming to the United States, was graduated at the Massachusetts Institute of Technology in 1889. He was chemist and metallurgist in different steel works until 1897; and in 1897–1905 he owned and directed the Boston Testing Laboratories. He lectured on metallurgy at the Massachusetts Institute of Technology in 1898–1903; was connected with the Harvard University faculty from 1899; in 1905 he became professor of metallurgy there; and from 1924 he held the Gordon McKay professorship at Harvard University. In 1917 he became metallurgist with the American Aviation Commission in France and also served at that time as metallurgical expert for the French Ministry of Munitions. He edited the *Metallographist* in 1898–1903 and the *Iron and Steel Age* in 1903–06. Author of 'Metallography of Iron and Steel' (1912); 'Germany and the European War' (1915). D. 26 Jan. 1939.

SAVAGE, Edward, American portrait painter and engraver: b. Princeton, Mass., 26 Nov. 1761; d. there, 6 July 1817. He was a goldsmith and engraver in early life, but eventually turned to portrait painting, and established his reputation through his portraits of Washington, who sat for him several times, and of whom he in 1790 finished the portrait painted as a gift to Harvard. He studied abroad in 1791–94, under West in London and later in Italy. On his return to the United States he established a studio in Philadelphia and later painted in New York, maintaining there for many years an art gallery. He painted portraits of Thomas Jefferson, Anthony Wayne, Knox and other famous persons; finished R. E. Pine's 'Congress Voting Independence' (Philadelphia Historical Society), and executed 'Family Group at Mount Vernon' (1796), as well as making many steel engravings of his own portraits.

SAVAGE, Henry Wilson, American theatrical manager: b. New York, 1859; d. Boston, Mass., 29 Nov. 1927. He was graduated at Harvard University in 1880 and afterward engaged in the theatrical business. He was president of the Henry W. Savage Company; built Castle Square Theatre in Boston; and was director of the National Association of Theatrical Producing Managers of America.

SAVAGE, James, American antiquarian: b. Boston, Mass., 13 July 1784; d. Boston, 8 March 1873. He was graduated from Harvard in 1803, studied law, was admitted to the bar, served in both branches of the legislature and then retired from political life to engage in literary work. He published numerous historical and political pamphlets and edited many works concerning New England history. His work is unfortunately marred by a partisan spirit and is somewhat confused in plan. He wrote 'Genealogical Dictionary of the First Settlers of New England, showing three Generations of those who came before May 1692' (4 vols., 1862–64), and edited Winthrop's 'History of New England' (1825–26); Paley's 'Works' (5 vols., 1828), etc.

SAVAGE, Minot Judson, American Unitarian clergyman: b. Norridgewock, Me., 10 June 1841; d. 22 May 1918. He studied at Bowdoin College, and thereafter was graduated from Bangor Theological Seminary in 1864 and for three years (1864–67) was a Congregational home missionary, in California. There he established churches in Grass Valley and San Mateo. He occupied Congregational pulpits in Framingham, Mass., and Hannibal, Mo. (1867–69), (1869–73). Becoming a Unitarian he was made pastor of the Third Unitarian Church in Chicago (1873–74), and a year later became pastor of the church of the Unity, Boston, where he remained for 22 years. In 1896 he became pastor of the church of the Messiah, New York City, resigning the pastorate in May 1906. He represented the more radical element of his denomination and was the first clergyman who accepted "evolution." He was a voluminous writer upon ethical and religious subjects. Among his many books are 'Christianity the Science of Mankind' (1873); 'The Religion of Evolution' (1876);

'Social Problems' (1886); 'My Creed' (1887); 'Religion of To-Day' (1897); 'Our Unitarian Cause' (1898); 'Life Beyond Death' (1901); 'Life's Darkest Problems' (1905); 'The Passing and Permanent in Religion' (1901).

SAVAGE, Richard, English poet: b. London, 10 Jan. 1698 (?); d. Bristol, 1743. He claimed to be the illegitimate son of Anne, Countess of Macclesfield, by Richard Savage, Earl Rivers, but was probably the son of a woman who had been employed to nurse a natural son of the countess by that earl. This child, according to the countess, died when quite young, and she declared that Savage was an imposter. Savage was apprenticed to a shoemaker, having probably received some education at a grammar school near Saint Albans. He turned to literature and became an author as a means of livelihood. His first work, a pamphlet on the Bangorian controversy, was followed by two comedies, 'Woman's a Riddle,' performed in 1716, and 'Love in a Veil.' These procured him the acquaintance of Sir Richard Steele and Wilkes, the actor. His tragedy, 'Sir Thomas Overbury,' was brought out in 1723, the author himself playing the leading part, but with little success. Savage was rising in reputation when, in 1727, he killed a man in a tavern brawl. He was tried and sentenced to death, but through the influence of Lady Hertford was pardoned. In 1728 appeared 'The Bastard,' a poem of some merit. Soon after Lord Tyrconnel (a nephew of his alleged mother) received him into his house and allowed him £200 a year. In 1729 he published 'The Wanderer: a Moral Poem.' A quarrel with his patron once more turned him adrift upon the world. A birthday ode addressed to Queen Charlotte in 1732 procured him a pension of £50 from the queen. In 1735 a satire against the clergy, entitled 'Progress of a Divine,' caused a prosecution to be instituted against him; but the information was dismissed. From this period he appears to have sunk into the lowest misery. The death of the queen and the loss of his pension completed his ruin, although Pope and a few friends raised a subscription with a view of enabling him to reside in Wales. But at Bristol he was arrested for debt and thrown into the county jail, where, after a detention of some months, he died. Besides the works above mentioned he was the author of much occasional verse and other miscellaneous writings. Savage was the friend and companion of Samuel Johnson at the time when the latter was sleeping in the streets of London houseless and penniless. Consult Johnson, 'Life of Savage' (1744); Galt, 'Lives of the Players'; Boswell, 'Life of Johnson'; Thomas, in 'Notes and Queries' (1858).

SAVAGE, Richard Henry, American soldier and novelist: b. Utica, N. Y., 12 June 1846; d. New York, 11 Oct. 1903. He was graduated from West Point in 1868 as brevet second lieutenant and in 1871 served as vice-consul of the United States at Rome and Marseilles. In 1872 he was military secretary, with the rank of major, in the Egyptian army and in the latter part of 1872 and during 1873 was United States commissioner to Texas, to settle the Mexican-Texas border dispute. During the Spanish-American War he served as senior major of the United States volunteer engineers. He was a voluminous writer and published among other books 'My Official Wife,' which has been translated into 17 languages; 'For Love and Life'; 'In the Shadow of the Pyramids'; 'Brought to Bay'; 'The Midnight Passenger' (1900).

SAVAGE ISLAND, or **NIUE,** an island of the south Pacific, 40 miles in circumference, and lying between the Samoa and Tonga groups. It is very fertile. Chief products — copra, coffee and fruit. Trade is almost exclusively with New Zealand, to which it was annexed in 1901. The inhabitants are a mixed race of Samoans and Melanesians. They are a quiet people and have become Christians. They speak a Samoan dialect.

SAVAGE STATION, Battle of. While General Sumner was engaging General Magruder at Peach Orchard or Allen's Farm on the morning of 29 June 1862, General Franklin was informed that «Stonewall» Jackson, after repairing the bridges, was crossing the Chickahominy in force and advancing toward Savage Station. Franklin immediately withdrew Smith's division from an isolated and exposed position on Sumner's right and notified Sumner, who at 12 o'clock fell back two and one-half miles to Savage Station and united with Franklin, who had Smith's division only, Slocum's having been sent by McClellan across White Oak Swamp. McClellan had ordered Heintzelman, with his corps, to hold the Williamsburg road until dark, at a point where were several field-works and a skirt of timber between these and the railroad; but through a misunderstanding of his orders, and being convinced, he says, that the whole open space near Savage's was crowded with troops, more than he supposed could be brought into action judiciously, in the afternoon he marched his entire corps, except two batteries, to the rear across White Oak Swamp, without orders from any one, and without a word to Sumner, who, by seniority, was in command, McClellan not being on the field. On reaching Savage Station, Sumner and Franklin drew up in line of battle in a large open field to the left of the railroad, the left, held by Sumner, resting on the edge of the woods, Richardson's division forming his right, Sedgwick's his left. Smith's division on the right extended down to the railroad, with Hancock's brigade reaching into the woods to the right and front to hold the railroad. Davidson's brigade was in reserve, and Osborn's battery was on the line. It was after these dispositions had been made that Heintzelman withdrew and imperiled the left of Sumner's line. Magruder had slowly and cautiously followed Sumner from the Peach Orchard and it was near 5 o'clock when McLaws' division, moving along the Williamsburg road and through the timber that Heintzelman was supposed to be holding, began an attack upon Sumner's left, and was held in check by the vigorous fire of Sumner's artillery. McLaws pressed his attack with great impetuosity, and a hotly contested fight took place on the Williamsburg road. Six regiments of Sedgwick's division, followed by one of Richardson's, were hastened to the threatened point; Brook's Vermont brigade was thrown into the woods that Heintzelman had abandoned, six batteries opened fire,

and at dark, after partial success on either side, the battle ceased, with Sumner's line intact, and the Confederates repulsed. A novel feature of the engagement was the use by the Confederates of a 32-pounder gun, mounted on a platform-car, plated with iron, which was pushed down the railroad, and sent its shells into Sumner's line. Soon after the cessation of the fight, and the destruction of a large amount of supplies, Sumner continued the retreat across White Oak Swamp, abandoning to the Confederates 2,500 sick in the hospitals. McLaws reports a loss of 345 killed and wounded; the total Confederate loss was about 400 killed, wounded and missing. The Union loss is not accurately known.

Consult *Official Records of the Union and Confederate Armies and Navies,* 130 vols. (Washington, D. C., 1880–1901); Johnson, R. U., and Buel, C. C., *Battles and Leaders of the Civil War,* 4 vols. (New York 1884–1888).

E. A. CARMAN.

SAVAII, island. See SAMOAN ISLANDS.

SAVANILLA, one of the names of the tarpon (q.v.).

SAVANNA, city, Illinois, in Carroll County; altitude 592 feet; on the Mississippi River; 138 miles northwest of Chicago; on the Milwaukee, and Burlington railroads. It has large railroad shops and yards, and is a shipping point for the livestock and truck crops of a fertile farm area. Mississippi Palisades State Park is located there. It was settled in 1829. Pop. (1940) 4,792; (1950) 5,058.

SAVANNA-LA-MAR, sà-văn'à-là-mär', seaport, Jamaica Island, British West Indies, seat of Westmoreland Parish, 90 miles west-northwest of Kingston. It is an important trading and shipping center for a district producing sugar, coffee, cacao, ginger, pimento, dyewood, and rum. It is frequently damaged by hurricanes. Pop. (1943 est.) 4,046.

SAVANNAH, city, Georgia, county seat of Chatham County, on the Savannah River, 16 miles from the mouth. It is served by the Atlantic Coast Line; Central of Georgia; Seaboard Air Line; Southern; and Savannah and Atlanta railroads, thus being one of the foremost railway centers of the South.

The city is built on a walled bluff overlooking the river; it is the birthplace of the colony of Georgia and is the second largest city in the state but easily first in historic interest. Its homes recall Georgian England and its gardens and grilled gateways and fences are reminders of its great past. Several improved highways enter the city and it has steamship communication with the principal cities of the Atlantic seaboard, with Central and South America and other ports. Its proximity to the ocean tempers the summer heat with cool breezes while its wealth of flowers and tropical plants gives it an atmosphere unique among American cities.

Commerce.—It is one of the great commercial cities of the South and is the greatest cotton port on the Atlantic coast of the United States. It is the state port of Georgia. It has a water frontage of approximately ten miles. It is one of the great world markets for the shipment of naval stores. The largest sea-going vessels load at the city wharves and the river is navigable as far as Augusta. In addition to cotton and naval stores it ships large quantities of lumber and tobacco.

Manufactures.—The number of industries and their products has largely increased in recent years. The industries include fertilizer plants, cottonseed oil mills, iron foundries, saw mills, planing mills, rice and flour mills, cotton mills, furniture, sash, doors and blind, broom and varnish factories, printing offices, book binderies, a lithographing establishment, sugar refinery and barrel manufactures. There are manufactures of cigars, chemicals, drugs, feeds, ice, novelties, paper and paper bags, plumbers' supplies, vinegar, and tobacco products factories.

Places of Interest, Public Buildings, Etc.—In and near Savannah are many places of interest. These include the Fort Pulaski National Monument; Wormsloe Gardens, a historic old plantation; Barbee's Diamond Back Terrapin Farm, located at Isle of Hope; Bonaventure Cemetery; Savannah Beach, on Tybee Island; the Tybee Lighthouse; the city hall; the United States custom house; St. John's Episcopal Church; the Independent Presbyterian Church; Armstrong Junior College; Hodgson Hall, which houses the Georgia Historical Society; the public library; the Old Harbor Light; the Colonial Park Cemetery; St. John the Baptist Cathedral; the city market; and many old homes of distinctive architecture or of historic interest including the Wayne-Gordon Home, the Sorrel-Weed House, the Green-Meldrim House, Henry Jackson House, Factors' Row, the Flint House, the Woodbridge House, the Dennis House, the Owens-Thomas House, and many large buildings of modern architecture.

Churches and Schools.—Prominent among the church buildings are Wesley Monumental Methodist Church, Trinity Methodist Church, First Baptist Church, St. John's Church, Hebrew Synagogue Mickve Israel. There are over 40 churches in the city, several of which are for the colored. The city also has the Telfair Academy of Arts and Sciences, one of the finest art galleries in the South, opened in 1885. Its art classes and loan exhibitions are a great asset to the cultural life of the city; the Herty Foundation Laboratory, established in 1932, now conducted by the foundation under the auspices of the state was the first to demonstrate the possibility of making paper pulp from Georgia pine.

Parks and Monuments.—The streets are wide and beautifully shaded and intersected with parks or squares at regular intervals. In Johnson, Monterey and Madison squares are monuments to Nathanael Greene, Count Pulaski, and Sergeant William Jasper, heroes of the Revolution. In Forsyth place stands a monument to the Confederate dead. There is also a monument to Tomichichi, the Indian chief.

Government.—The city is governed by a mayor and city council.

Resort Facilities.—Savannah is widely known as an all-the-year-round resort. Its hotels are among the most attractive in the United States, and, in the winter especially, are usually filled with guests. Savannah Beach, 18 miles away, is an attractive bathing resort and is reached by an excellent improved highway. There are numerous golf courses and other sports attractions.

History.—Savannah was founded by Gen. James Oglethorpe in 1733 and was chartered in 1789. In 1778 the British captured the city. In October of the following year it was besieged

by the American and French forces, and in a battle fought on the 9th of that month the combined armies were defeated. In this assault Count Pulaski was mortally wounded. The town remained in the possession of the British until the close of the Revolutionary War. During the Civil War the city was a prominent depot of supplies for the Confederate armies and was the objective point of General Sherman in his march to the sea. After a brief defense it was evacuated by the Confederates and the Union army took possession Dec. 21, 1864.

Population.—In 1850 the population was 15,312; in 1900, 54,244. The corporate limits of the city have since been extended several times in recent years, that is in 1924, 1925 and in 1928. The population in 1910 was 65,064. In 1920 it was 83,252; in 1930, 85,024; in 1940, 95,996; and in 1950, 119,638.

THOMAS PURSE.

SAVANNAH, city, Missouri, Andrew County seat; altitude 1,115 feet; 12 miles north of St. Joseph; on the Burlington and the Chicago Great Western railroads. The surrounding area produces corn, oats, and wheat, and walnut timber; the city is a shipping point for farm produce, poultry, and livestock. In the Civil War it was overrun by both Federals and Confederates. The settlement was platted in 1841. Pop. (1940) 2,108; (1950) 2,332.

SAVANNAH, a river formed by the junction of the Tugaloo and Seneca rivers, and which, from its source, forms the boundary between Georgia and South Carolina. The length of the channel from its source to its mouth is 314 miles, but from the source to the mouth in direct line is only 250 miles. The area of the drainage basin is about 8,500 square miles. The current in the upper part of its course is rapid; considerable quantities of silt are brought down each year, and bars form in the broad portions of the stream where the current moves slowly. The tidal wave ascends to a point about 25 miles above Savannah. At Savannah the rise and fall of the tide is six and one-half feet. The river is navigable for small vessels to Augusta, 212 miles, and for large vessels as far as Savannah. In Aiken and Barnwell counties, on the river, is the United States Atomic Energy Commission's Savannah River Plant (begun in 1951).

SAVANNAH (Ga.), **Operations Against,** in the American Revolution. Since operations in the North had been barren of results, the British determined to renew the attack on the South, beginning the campaign at Savannah. Late in November 1778 Col. Archibald Campbell sailed from New York, landing three weeks later near the mouth of the Savannah River, and quickly dislodging a small force of Americans who attempted to dispute the British advance. Gen. Robert Howe (q.v.) with 800 American troops encamped between the landing place and the city, but a Negro apprised Campbell of a by-path by which he could gain the rear of the American camp, and in the battle that followed the Americans found themselves between a cross-fire. Hence they retreated, leaving 100 of their number dead and wounded and about 400 in British possession. The Americans fled up the Savannah River and crossed into South Carolina, while the British occupied the city and remained in possession until the close of the war. Meanwhile, in November 1778, Comte d'Estaing had sailed with a French fleet to attack the British West Indies, after which, at the solicitation of the Americans, he went to Savannah, arriving Sept. 1, 1779 with 22 ships of the line and other smaller vessels. Gen. Benjamin Lincoln (q.v.) with 1,000 troops, reinforced by troops under Count Pulaski (q.v.), and Colonel McIntosh and a detachment of 3,000 French troops, lay siege to the city by land while d'Estaing carried on the naval operations. The city was defended by Gen. Augustine Prevost with about 2,500 troops. On Sept. 23, 1779 siege works were begun and on October 1 the various batteries opened a bombardment, which continued for several days without effect. Despairing of capturing the city by this method the allied forces decided to storm the British works. Accordingly, on October 9, 4,500 French and Americans advanced in three columns, but were met with such a galling fire from the British batteries that, though successful in planting standards on the redoubts, they were repulsed with considerable loss. With 200 troops Pulaski endeavored to strike the garrison in flank, but he was killed and his troops dispersed. Unable longer to withstand the British fire, the attacking forces retired, the French having suffered a loss of 640 killed and wounded and the Americans 450. The British loss was comparatively small. On October 18 the siege was abandoned, the Americans recrossing the Savannah at Zubly's Ferry, and taking position in South Carolina, while the French embarked on their ships and sailed away.

Consult Stedman, Charles, *History of the Origin, Progress, and Termination of the American War,* vol. 2, pp. 121-134 (New York 1794); Lossing, Benson John, *Pictorial Field Book of the Revolution,* vol. 2, (New York 1850–1852); Carrington, H. B., *Battles of the American Revolution,* pp. 478-482 (New York 1876); Lowell, E. J., *The Hessians . . . in the Revolutionary War* (New York 1884); Mahan, Alfred T., *Influence of Sea Power upon History, 1660–1783,* pp. 374-375 (New York 1897).

SAVANNAH TO GOLDSBORO, Sherman's Campaign from (including the battles of Averasboro and Bentonville). Sherman's March to the Sea culminated in the capture of Savannah Dec. 21, 1864. It was a brilliant campaign, but of minor importance compared with that upon which he immediately prepared to enter. He says: "Were I to express my measure of the relative importance of the march to the sea, and of that from Savannah northward, I would place the former at one, and the latter at 10, or the maximum." Before the capture of Savannah, Sherman had received from General Grant a letter, dated December 6, in which he had given his idea of Sherman's further movement, which was to establish a base on the sea coast, fortify it, leave all artillery and cavalry, and enough infantry to protect them and threaten the interior, so that the militia of the South would have to be kept at home, and with the remainder of his command take transports for James River, join Grant before Richmond and participate in the destruction of Lee's army and the overthrow of the Confederacy. Sherman replied: "I had expected, after reaching Savannah, instantly to march to Columbia, S. C., thence to Raleigh, and then to report to you." After the surrender of Savannah, Grant (December 27) accepted Sherman's plan and instructed him to start on his expedition northward without further delay, break up the railroads in South Carolina

and North Carolina and join the armies operating against Richmond as soon as he could and by the route he deemed best. Sherman hastened his preparations; General Grover's division of the 19th corps was detached from the Army of the Shenandoah and ordered to Savannah as a garrison, and General Foster, commanding the Department of the South, was instructed to follow Sherman's inland movements by seizing in succession Charleston and other points on the coast, which might be abandoned. Ammunition, rations and clothing were accumulated, and 14 Jan. 1865 the 17th corps, General Blair, took transports at Savannah for Hilton, S. C., and moved to Beaufort, thence to Pocotaligo, on the Charleston and Savannah Railroad, thus threatening Charleston. Later the 15th corps, except Corse's division, joined the 17th. The left wing, 14th and 20th corps, under General Slocum, with Corse's division and Kilpatrick's cavalry, moved up the Savannah River, 40 miles, to Sister's Ferry, thus threatening Augusta. When Slocum arrived at Sister's Ferry the river had overflowed its banks and submerged the adjacent lowland, and there was a delay of some days before the waters had fallen sufficiently for a crossing. On 1 February, when the general movement began, the army was composed of two wings: the right wing, under Gen. O. O. Howard, consisted of the 15th corps, Gen. John A. Logan, and the 17th corps, Gen. F. P. Blair; the left wing, under Gen. H. W. Slocum, consisted of the 14th corps, Gen. J. C. Davis, and the 20th corps, Gen. A. S. Williams. The cavalry division, under General Kilpatrick, moved with the left wing, as also, at first, Corse's division of Logan's corps. The strength of the army 1 February was 53,923 infantry, 4,438 cavalry and 1,718 artillery, in all 60,079 men with 68 guns. There were about 600 ambulances, 2,500 wagons and provisions for 20 days, mostly of bread, sugar, coffee and salt. Beef cattle were driven and it was expected that a good supply of cattle, hogs and poultry would be gathered on the march. The disposition of the forces from Sister's Ferry on the left to Pocotaligo on the right menaced Augusta, Columbia and Charleston and left the Confederates in doubt as to the true point upon which Sherman was to move. The Confederates, under General Hardee, whose headquarters were at Charleston, and who had about 16,000 men, occupied the line of the Salkehatchie River, while Wheeler's cavalry operated on the heads and flanks of the advancing column. On 1 February the movement began. Howard's right wing marched from Pocotaligo for the Beaufort and Rivers' bridges of the Salkehatchie for the purpose of pushing on to the Edisto River, thus flanking Charleston. There was a sharp engagement (3 February) at Rivers' bridge, in which two divisions of Blair's corps waded breast deep through the swamp and carried the bridge with a loss of 88 killed and wounded, the Confederate loss being 52 killed and wounded. The Confederates, driven from the line of the Salkehatchie, retreated to Branchville, behind the Edisto, burning the bridges behind them. The left wing, under Slocum, marched through Barnwell, and on 10 February both wings were in the vicinity of Branchville on the Charleston and Augusta Railroad. Kilpatrick on the left went as far as Aiken and threatened Augusta. From Branchville the railroads in every direction were thoroughly destroyed, and the army started for Columbia, each of the four corps taking a separate road. Howard went by the Orangeburg road, and on the 16th his head of column approached Columbia, which was occupied by Gen. C. L. Stevenson's division of infantry, and Butler's and Wheeler's divisions of cavalry, in all about 5,000 men. Stevenson fell back to Winnsboro, leaving Wade Hampton, commanding the cavalry, to follow. On the 17th the 15th corps marched through the city and encamped beyond it on the Camden road. During the night the greater part of the city was accidentally burned. Slocum, advancing by Barnwell and Lexington, destroyed the Charleston and Augusta Railroad for several miles, and, after menacing Augusta, received orders to cross the Saluda River, at Mount Zion's Church, above Columbia. During the night a bridge was constructed and next day Slocum and Kilpatrick crossed, passed over Broad River and on the 21st arrived at Winnsboro, destroying on the way several miles of railroad north and south of Alston. Sherman, with the right wing, marched from Columbia, on the 20th, on the direct road to Winnsboro, and threatened Charlotte, N. C. He destroyed the railroad between Columbia and Winnsboro, and joined Slocum at the latter place. On the day that Sherman occupied Columbia, General Hardee evacuated Charleston, after destroying the public buildings, two iron-clad steamers, cotton and other property, and with about 14,000 men moved to Cheraw, on the Peedee River, and thence by a long march to Fayetteville, N. C. Next day Charleston was occupied by the Union troops of General Foster, who found 450 abandoned guns. The city had been fired, churches and private residences burned and everything presented a scene of desolation. Sherman, in his march, had made a clean swath of 40 miles, burning bridges, wrecking railroads and devouring nearly everything. Each family was left a reasonable amount of food, but all horses, mules and wagons were taken. From Winnsboro, Slocum destroyed the railroad as far north as Chester, threatened Charlotte, and then, forcing to the left the Confederates who were concentrating to dispute the march on Charlotte, the entire army turned eastward for Fayetteville, Slocum crossing the Catawba River at Rocky Mount and joining Howard, who had marched by roads farther south, at Cheraw (3 March), where were found 24 guns, 3,600 barrels of gunpowder and large supplies of stores, public and private, sent from Charleston for safe-keeping. Hardee made no opposition to the occupation of the place, and retreated to Fayetteville, leaving Wade Hampton's cavalry to cover his rear and burn the bridges behind them. On the 6th Sherman resumed his march on Fayetteville, by four different roads, and reached it on the 10th, Hardee again retreating without a show of defense, leaving Wade Hampton to skirmish with Sherman's advance and burn the bridge over the Cape Fear River. Kilpatrick, covering the movement on Sherman's left and rear, was surprised on the night of the 9th by Hampton's cavalry and pretty roughly handled, being driven from his camps and losing all his guns, which, however, he regained. He lost 183 men,

of whom 103 were captured. The march through South Carolina had been greatly delayed by almost incessant rains and the swampy nature of the country. Nearly all the way the army was compelled to corduroy the roads before the trains could be moved, in some instances the first corduroying was out of sight before the trains had all passed, and another road was laid over it. All this was done cheerfully by the men, working in icy water up to their knees. Before reaching Fayetteville it was heard that General Terry had taken Wilmington, and the day after the arrival of the army a Union steamer came up Cape Fear River, confirming the news and bringing mails and dispatches. Having thoroughly destroyed the arsenal buildings, foundries and machine-shops at Fayetteville, the army crossed Cape Fear River on the 13th and 14th for Goldsboro, the objective point of the campaign, where it was to unite with Generals Schofield and Terry, who were marching on that place from Newbern and Wilmington. It was now known that Gen. J. E. Johnston had been ordered to delay Sherman's advance, and Sherman estimated that he had 37,000 men for the purpose. Apprehending that Johnston would seek an opportunity to strike him on the last stage of the march, Sherman ordered Slocum on the left to send his trains under a strong guard by an interior road on his right, and to keep at least four divisions with their artillery on the left well in hand, to meet an attack. Under this order Geary's and Baird's divisions were detailed to guard the trains. Slocum, preceded by Kilpatrick's cavalry, advanced on the direct road to Averasboro, to make a feint on Raleigh, and Kilpatrick was then to strike the railroad near Smithfield. Sherman says he "proposed to drive Hardee well beyond Averasboro and then turn to the right by Bentonville for Goldsboro." On the 15th Hardee was retiring from before Slocum, having for his rear-guard a brigade composed of artillery troops that had garrisoned Charleston, under command of Col. Alfred Rhett. During the evening Kilpatrick, in skirmishing with this rear-guard, near Taylor's Hole Creek, took some prisoners, among whom was Colonel Rhett.

Battle of Averasboro.— On the morning of the 16th opposition to the march was quite stubborn, and Kilpatrick, forcing back the Confederate rear-guard, came upon a line of intrenchments, on a narrow neck of swampy land, between Cape Fear and South rivers, and covering the road to Bentonville, along which Sherman intended that Slocum's wing should march to Goldsboro. Kilpatrick's cavalry was moved to the right and Jackson's and Ward's divisions of Williams' 20th corps were deployed in front of the Confederate line, and the two divisions of the 14th corps ordered up on Williams' left. Case's brigade was sent by Williams to the left to gain the flank and rear of the Confederate line, and succeeded in striking it in flank and sweeping it from position, capturing McBeth's Charleston battery of three guns and 217 of Rhett's artillery acting as infantry. Jackson's and Ward's divisions advanced and came upon the Confederates in another line of works about 400 yards in rear of the first. Kilpatrick was sent to the right to seize the Bentonville road, but his leading brigade was driven back by a furious attack of McLaws' division, upon which the Union infantry advanced directly against Hardee, who also was advancing, and drove him inside his works, and Slocum went into bivouac in his immediate front. During the night, which was stormy and very dark, Hardee retreated, leaving 108 dead and 68 wounded on the field. His entire loss, as estimated, was about 650, of whom 175 were captured. Slocum's loss was 77 killed and 477 wounded. Next morning Ward's division pursued Hardee a short distance beyond Averasboro and ascertained that he had retreated toward Smithfield.

Sherman was now under the delusion that no serious opposition would be made to his march on Goldsboro. "All signs," he says, "induced me to believe that the enemy would make no further opposition to our progress, and would not attempt to strike us in flank, while in motion." Under this impression his commanders were instructed to march their troops in the easiest manner and by the nearest roads to Goldsboro. The left wing marched from Averasboro on the direct road and on the night of the 18th, after driving back Hampton's cavalry to a position selected by Hampton for a battle, the 14th corps in advance, encamped 25 miles from Goldsboro and five from Bentonville, at a point where the road from Clinton to Smithfield crossed the one to Goldsboro. Two divisions of the 20th corps were camped 10 or 12 miles in rear, while Geary's and Baird's divisions were on other roads, with the trains still farther to the south. Howard's two corps were to the south and east, their advance at Lee's Store, more than a day's march distant. Sherman had been with Slocum and the left wing since the 14th and very early on the morning of the 19th started to join Howard, several miles to the east and south, to concentrate his forces and unite with Slocum at Goldsboro, where he expected to meet Schofield and Terry. He had no suspicion that General Johnston with a strong force was then in Slocum's immediate front, and supposed that the only opposition to be met would be from cavalry. When about to leave Slocum he expressed the opinion that Hardee had fallen back to Raleigh and that Slocum could reach Neuse River the next day, in which opinion Slocum concurred. But General Carlin, commanding a division of the 14th corps, and who was nearest the enemy, had observed matters that indicated a large force in front prepared for battle, and sought to impress his own convictions upon Sherman, who made light of them, said nothing but cavalry was in front and rode away to join Howard.

On 23 February Gen. J. E. Johnston had been assigned to the command of all the forces that could be collected to make head against Sherman. At this time Hardee was moving toward Fayetteville, N. C.; Beauregard was directing the march of C. L. Stevenson from Winnsboro to Charlotte; Cheatham, with his division of Hood's army, had come from Augusta, Ga., and was moving toward Charlotte, but on the west side of the Congaree and Broad rivers, and A. P. Stewart, with about 1,000 men of Hood's army, was marching for Charlotte. Johnston's first task was to concentrate these troops, which was done at Smithfield, N. C., where he was joined by Hoke's division from Lee's army at Richmond, which had unsuccess-

fully engaged General Cox, near Goldsboro (see KINSTON, BATTLE OF), and also by S. D. Lee, with about 3,000 men of Hood's army. In all Johnston had about 20,000 men. He had as subordinate commanders Generals Bragg, Hardee, A. P. Stewart, S. D. Lee, Wade Hampton and others of high rank, who had long been the pride and ornaments of the Confederate armies.

Battle of Bentonville.— On the 17th General Johnston had become satisfied that Sherman was not marching on Raleigh. He heard on the morning of the 18th that Sherman was marching on Goldsboro, and was informed by Wade Hampton that the 14th corps was in his immediate front, that the 20th corps was several miles in rear on the same road, while Howard's two corps were on roads some miles to the south, and he determined to crush the 14th corps before the 20th could come to its support, and then fall upon the 20th. He ordered Hampton to hold Slocum's head of column in check until he could march from Smithfield, 16 miles distant, and join him to give battle on ground that Hampton had selected, and to which he was forced back that evening, which was at a point about three miles south of Bentonville. In order to attack the head of Slocum's column early next morning, Johnston immediately marched his army from Smithfield, intending to bivouac that night between Bentonville and the road on which Slocum was moving. But the distance was greater than expected, the roads bad, and but a small part of the column reached Bentonville that night, the main column bivouacking some distance in the rear. As soon as Hardee's troops reached Bentonville next morning they were marched by the left flank, Hoke's division leading, to the ground selected by Hampton, on the eastern edge of an old plantation, extending one and one-half miles to the west, lying principally on the north side of the road, and surrounded east, south and north, by dense thickets of black-jack. As there was but one narrow road through the thicket, the deployment of the troops consumed a weary time. Hoke's division was formed with its centre on the road, its line at right angles to it, on the eastern edge of the plantation, and its left extending some 400 yards into the thicket to the south. Two batteries, the only artillery, were on his right, commanding the ground in front to the extent of the range of the guns. The troops belonging to the Army of Tennessee were formed on the right of the artillery, their right strongly thrown forward, conforming to the edge of the open ground. Meanwhile, and before these dispositions had been completed, the battle had opened. Very early in the morning Hampton had thrown forward his cavalry, and when Carlin's division of the 14th corps began its march at 6 o'clock it became almost immediately engaged with the Confederate cavalry, which offered such a stubborn resistance that Carlin deployed his entire division and brought up his artillery, and one brigade was sent to the left to develop the Confederate line, and as the resistance increased Morgan's division was moved to Carlin's right as a support, and the entire line was ordered to go forward, and was soon severely engaged, convincing Slocum that he had something more than cavalry in his front, of which fact he was soon further convinced by a deserter from the Confederates, who informed him that Johnston was in his immediate front, and that the talk in the Confederate camp was that Slocum was to be crushed.

Slocum prepared for defense by throwing up works, ordered Williams, commanding the 20th corps, to throw his train to the right and hasten up, and sent a messenger to Sherman with the information that Johnston's army was in his front. Carlin's division in advancing struck Hoke's division and after some severe fighting was repulsed, upon which Johnston ordered Hardee to charge with the right wing, Stewart's Army of Tennessee troops and Taliaferro's division, and General Bragg to join in the movement with his brigades successively, from right to left, each making the necessary change of front to the left in advancing. Hardee led his men forward and drove Carlin back just as the advance of the 20th corps came up, one brigade of which was sent to Carlin's support, and was driven back with him, and another put in the gap between Carlin and Morgan just as the Confederates reached the line, the remainder of the corps forming on Carlin's left. The Confederates had become somewhat broken up in advancing through the woods, and when they received a telling fire from behind the slight entrenchments that had hurriedly been thrown up they fell back. On the right Morgan's division of the 14th corps, with its supports, held its ground against Bragg's persistent attacks. The Confederate assaults were repeated several times until a late hour, each assault finding the Union line better prepared to receive it. Johnston had given the 14th corps a heavy blow, but had failed to crush it, and determined not to renew the attack, but only to hold the ground until his wounded could be removed. The battle of the 19th was fought by about 16,000 men of the 14th and 20th corps on one side and about the same number of Confederates on the other.

When Capt. Joseph B. Foraker delivered to Sherman the message from Slocum that he had run up against Johnston's whole army, Sherman was incredulous, but he sent word to Slocum to hold on, ordered the 15th corps, which was well to the rear, to turn at once toward Bentonville, and the 17th corps to move in the same direction. Hazen's division of the 15th corps reported to Slocum during the night and was placed on the right. Early in the morning of the 20th Geary and Baird, each with two brigades, arrived on the field. Baird was placed in front of the works and moved out beyond the advanced position held on the preceding day. The day was spent in strengthening the position and developing the line of the enemy, which brought on sharp skirmishing. The right wing under Howard came up late in the afternoon of the 20th and on the morning of the 21st. It had marched 20 miles over bad roads, skirmishing a great part of the way with the Confederate cavalry. There was heavy skirmishing during the day, but no general attack, and during the night Johnston retreated, crossing Mill Creek by the bridge at Bentonville and bivouacking on the night of the 22d near Smithfield. The Union loss in the battle was 191 killed, 1,168 wounded and 287 missing,

an aggregate of 1,643. The Confederate loss was 239 killed, 1,694 wounded and 673 missing, an aggregate of 2,606.

On the 22d Sherman resumed his march on Goldsboro and on the 23d and 24th his entire army was assembled around the place and junction made with Schofield's and Terry's forces, which had occupied it two days before. (See GOLDSBORO, KINSTON, etc.) "Thus," writes Sherman, "was concluded one of the longest and most important marches ever made by an organized army in a civilized country. . . . The country generally was in a state of nature, with innumerable swamps, with simply mud roads, nearly every mile of which had to be corduroyed. In our route we had captured Columbia, Cheraw and Fayetteville, important cities and depots of supplies, had compelled the evacuation of Charleston City and Harbor, had utterly broken up all the railroads of South Carolina and had consumed a vast amount of food and forage, essential to the enemy for the support of his own armies. We had in mid-winter accomplished the whole journey of 425 miles in 50 days, . . . and had reached Goldsboro with the army in superb order and the trains almost as fresh as when we had started from Atlanta." Consult *Official Records,* vol. XLVII; Van Horne, *History of the Army of the Cumberland,* vol. II; Sherman, *Memoirs,* vol. II; Johnston, *Narrative;* The Century Company's *Battles and Leaders of the Civil War,* vol. IV.

SAVARY, sä-vä-rē, **Anne-Jean-Marie-René,** DUKE OF ROVIGO, French general: b. Marcq, department of Ardennes, April 26, 1774; d. Paris, June 2, 1833. In 1789 he entered an infantry regiment. He served under Custine, Moreau and Desaix, and accompanied the last named on the expedition to Egypt. After the battle of Marengo he was appointed adjutant to Bonaparte, and soon rose very high in his confidence. After rising to the rank of lieutenant general he was rewarded, after the victory of Friedland, with the title of Duke of Rovigo. In 1808 the emperor sent him to Madrid, where he negotiated the arrangement by which the Spanish king and his son were kidnapped. In 1810 he succeeded Fouché as minister of police. On Bonaparte's return from Elba he gave in his adhesion to him, and was appointed inspector general of gendarmes. He was carried to Malta in 1815, but escaped after being a prisoner for seven months. While there he began his *Memoirs.* Later he stood trial at Paris as one who had contributed to Napoleon's return, but was acquitted. In 1831–33 he was military commander of Algiers.

SAVASTANA. See GRASSES IN THE UNITED STATES.

SAVERNE, sä-vĕrn′, (Ger. ZABERN), France, a town on the Zorn River, capital of the *arrondissement* of Bas-Rhin, in the department of the same name (formerly Lower Alsace), situated at the entrance to the Col de Saverne, a pass through the northern approaches to the Vosges, affording passage for the Rhine-Marne Canal, and the railway connecting Strasbourg with Metz and Nancy. It has sandstone quarries, and its manufactures include metal goods, optical glass, and a famous kirsch. Figuring in Roman times as a communications center called Tres Taburnae, and later for centuries as a possession of the bishops of Strasbourg, it has impressive ecclesiastical buildings, parts of which date back to the 12th century, and a Gallo-Roman museum. The ominous Zabern incident, a dispute between local recruits and the German military authorities, occurred here in November 1913, less than a year before the outbreak of World War I. Population (1936) 9,006.

SAVERY, Thomas, English engineer: b. Shilstone, near Modbury, Devonshire, about 1650; d. London, May 1715. He became a military engineer and rose to be captain in 1702. He is known for his inventions, most important of which was a machine for raising water from mines, which was the first practical application of steam power to a mechanical purpose. A patent granted him in 1698 extended until 1733.

SAVIDGE, Eugene Coleman, American physician and author: b. Maryland, Oct. 21, 1863; d. Oct. 10, 1924. He was graduated from the University of France in 1888; from that of New York in 1889. He was editor of the *Expressman* and was attending gynecologist at Saint Mark's Hospital, New York. He wrote *Wallingford* (1882); *Life and Times of Brewster* (1891); *The American in Paris* (1895); *Selective Involution; Philosophy of Radio-Activity* (1914); *The Problem of Cancer; Unclassified Dreams* (1915).

SAVIGNY, sä-vēn-yē, **Friedrich Karl von,** German jurist: b. Frankfort-on-the-Main, Feb. 21, 1779; d. Berlin, Oct. 25, 1861. He studied chiefly at Marburg, became a lecturer there in 1800, and in 1803 professor of jurisprudence. In 1808 he was made professor of law in the University of Landshut, in Bavaria, and in 1810 obtained the chair of jurisprudence in the newly established University of Berlin, where he continued to lecture with uninterrupted success for 32 years. He was elected a member of the Prussian Academy of Science in 1811, was appointed a councilor of state in 1817 and in 1842 minister of justice for the revision of the law. He retired in 1848. His principal works are *Geschichte des römischen Rechts im Mittelalter* (1815–31); *System des heutigen römischen Rechts* (1840–48), to which *Das Obligationenrecht* (1851–53) forms an appendix; *Vermischte Schriften* (1850), a collection of essays which had appeared in legal periodicals. He brilliantly applied the historical method to the exposition of the Roman law. Consult the biographies by Bethmann-Hollweg (1867) and Enneceerus (1879).

SAVILE, săv′ĭl, or **SAVILLE, George,** MARQUIS OF HALIFAX, English statesman and writer: b. Thornhill, Yorkshire, Nov. 11, 1633; d. London, April 5, 1695. On the death of Cromwell he distinguished himself by his exertions in behalf of Charles II. In 1669 he was appointed a commissioner of trade, in 1672 became a member of the Privy Council, and in 1682 was created Marquis of Halifax and lord privy seal. Under James II he was made president of the council, but was dismissed from office because he opposed the repeal of the Test and Habeas Corpus acts. From this time Lord Halifax continued in opposition, and contributed to the elevation of William III to the throne. He was the author of *Advice to a Daughter* (1868), and of a variety of political tracts, the principal of which are *Maxims of State; The*

Character of a Trimmer; Character of King Charles II; Anatomy of an Equivalent; Letter to a Dissenter.

SAVILE, Sir **Henry,** English scholar: b. Bradley, near Halifax, Yorkshire, Nov. 30, 1549; d. Eton, Feb. 19, 1622. He was educated at Oxford, became tutor in Greek to Queen Elizabeth, and in 1585 was made warden of Merton College and provost of Eton in 1596. He was knighted in 1604. In 1619 he founded two professorships in geometry and astronomy at Oxford, besides conferring several other valuable benefactions, both in property and books. Among his works the principal are his *Commentaries on Roman Warfare* (1591); *Rerum Anglicarum post Bedam Scriptores* (1596); *Praelectiones tresdecim in principium elementorum Euclidis* (1621); and his edition of the writings of St. Chrysostom (1610–1613), in eight folio volumes.

SAVILLE, Marshall Howard, American archaeologist: b. Rockport, Mass., June 24, 1867; d. New York, N. Y., May 7, 1935. He studied anthropology as a special student at Harvard University in 1889–1894, and afterward engaged in field work under Professor F. W. Putnam. He conducted investigations of the remains of the Ohio mound builders, making some notable discoveries. He also made important explorations in Yucatan in 1890; in Honduras in 1891–1892, 1915; in Mexico in 1899, 1902–1904; in Ecuador in 1906–1910, 1913; in Colombia in 1914; and in Central America in 1917. He was on the staff of the American Museum of Natural History, 1894–1905; professor of American archaeology, Columbia University, after 1903; and on the staff of the Museum of the American Indian after 1918.

SAVIN, or SABIN. See Juniper.

SAVINGS AND LOAN ASSOCIATIONS. These organizations are the only financial institutions in the United States devoted almost exclusively to the promotion of thrift and home ownership. Their motto is: "The American home is the safeguard of American liberties."

In addition to the term, "savings and loan associations," these organizations are known as building and loan associations, building associations, homestead associations, and cooperative banks. The savings and loan name is required by law to be used by all federal savings and loan associations, representing nearly one half the assets of the business, and is required or permitted by law, and used by such associations incorporated under state law in most of the states. The name "cooperative bank" is used by the state organizations in Massachusetts and Rhode Island. It is estimated that associations having about 70 per cent of the assets operate under the name of "savings and loan association," about 10 per cent under the name "cooperative bank," and most of the remainder under the name "building and loan association." The trend is toward the use of the name "savings and loan association."

The first such association in America, similar to the building societies (q.v.) in England, was organized in 1831 in Frankfort, now a part of Philadelphia, Pa. Many of the early organizations, prior to 1850, were organized as terminating associations for the sole purpose of enabling each member to acquire a home. In many of these cases, a sufficient number of members would join in the beginning so that the monthly payment of $10, or some such sum, would provide enough money to build one member a home each month. In some cases there was a drawing each month, and the most fortunate member received the funds to build his home at once and secured his obligation to pay monthly until all members received the money for a home by a mortgage on his home. This provided 100 per cent of the money for a lot and a home and, in some cases, no interest was charged. These terminating associations rendered a great service for about a generation.

Because of this service, new associations were organized as serial associations. In these organizations, a new group of members were received periodically, quarterly, semiannually or annually, and each series operated substantially as a terminating association, but the organization was continuous. Many of these associations were opened to members who desired to save, some of whom did not desire to build a home; therefore interest was charged to borrowers, and nonborrowers received their savings with their earnings upon maturity of their contract. Those who borrowed and got their homes early, paid interest in addition to their share payments; those who waited, received earnings and therefore completed their payments in a shorter period of weeks or months. The serial associations rendered great service in the promotion of thrift and home ownership from about 1850 to 1890, and many of them were still serving acceptably in 1950.

Permanent associations were organized at an early date in Charleston, S. C., Dayton, Ohio, and elsewhere. These associations accepted new members from day to day and payments were made to them either in regular installments or at the option of the member. They loaned money for the financing of homes and charged interest in the customary manner. The serial associations and the permanent associations made great progress from about 1900 until about 1930.

In 1933, at the bottom of a long depression affecting real estate values and other values, the Congress of the United States authorized the chartering, examination, and supervision by the federal government of federal savings and loan associations. These associations are similar to the mutual savings banks. They accept savings and investment funds and issue share accounts to the savers and investors, who share the net earnings of the fund semiannually as dividends. Such funds are withdrawable at the request of the saver or investor, subject to the right of the association to pay withdrawals, in time of stress, after 30 days, and in an orderly manner, from receipts, as specified in the charter of the association, which is available to all members. Customarily, savers and investors withdraw their funds at their convenience, as in the case of any other savings account. Their funds are employed in the making of monthly amortized home mortgage loans within 50 miles of the office of the association, with a provision authorizing not over 15 per cent of assets to be employed in the making of loans within said area or outside of it, but secured by first lien upon other improved real estate; and they are authorized to invest in government bonds without limit. Most state associations are now organized and operate upon substantially the same basis.

Until recent years, customarily, the borrower signed a note for the amount of money borrowed,

with interest payable weekly or monthly in a specified amount, which note was secured by a mortgage upon the home of the borrower and also by the pledge of a share account in the same amount and maturing upon the maturity of such share account. The loan contract included a subscription to shares of the association in the same amount as the loan and provided for weekly or monthly payments thereon until such account, including payments and earnings, became paid up, at which time, under the contract, the funds were withdrawn from the matured share account and used to liquidate the indebtedness represented by the note. When money was cheap, customarily interest was charged, but when money was dear, in some cases the customer paid a lump sum discount on his loan in the beginning or a monthly premium, in addition to interest. Generally, the monthly payment, representing interest on the loan, premium, if any, and share payment, was approximately the same as the rental value of the home. Such loans customarily paid out in about 12 years.

In the late 19th century many of the permanent plan associations and, more recently, many serial associations and all federal associations began to make definite contract, direct reduction loans, and this system is now almost universally used. Under this plan, the borrower signs a note or bond for the amount borrowed, providing for monthly payments (which are customarily about the same as rent) which are applied, first, to interest at a specified rate upon the unpaid balance of the indebtedness and the balance to principal, until the indebtedness is paid in full, and such note is secured by first mortgage on the home. Upon these loans, the monthly payment is carefully adjusted to the family budget so as to pay the indebtedness in full in from 10 years to about 20 years.

Formerly, homes were financed under very rigid contracts, which frequently embarrassed the

Table 1—NUMBER OF SAVINGS AND LOAN ASSOCIATIONS' ASSETS

State	Number of institutions			Total assets			Increase over 1948
	State	Federal	Total	State	Federal	Total	
Alabama	8	20	28	$ 10,150,000	$ 47,798,000	$ 57,948,000	$ 8,577,000
Arizona	4	2	6	8,621,000	22,647,000	31,268,000	3,835,000
Arkansas	8	34	42	8,896,000	47,406,000	56,302,000	8,181,000
California	109	74	183	531,734,000	706,157,000	1,237,891,000	191,072,000
Colorado	28	23	51	38,757,000	83,798,000	122,555,000	17,863,000
Connecticut[1]	31	17	48	60,461,000	132,916,000	193,377,000	19,992,000
Delaware	39	1	40	22,263,000	1,654,000	23,917,000	1,941,000
District of Columbia	21	8	29	298,040,000	78,435,000	376,475,000	19,368,000
Florida	5	50	55	7,011,000	309,676,000	316,687,000	46,028,000
Georgia	18	53	71	14,589,000	190,893,000	205,482,000	28,280,000
Idaho	3	8	11	1,269,000	34,422,000	35,691,000	4,672,000
Illinois	482	103	585	611,415,000	607,968,000	1,219,383,000	182,440,000
Indiana	165	69	234	210,799,000	278,096,000	488,895,000	40,877,000
Iowa	56	32	88	86,007,000	78,601,000	164,608,000	20,304,000
Kansas	75	28	103	89,213,000	81,703,000	170,916,000	20,645,000
Kentucky	66	54	120	66,521,000	166,009,000	232,530,000	16,540,000
Louisiana	62	14	76	184,087,000	33,796,000	217,883,000	28,339,000
Maine	30	5	35	34,456,000	7,094,000	41,550,000	2,103,000
Maryland[2]	330	32	362	155,330,000	160,711,000	316,041,000	8,950,000
Massachusetts[3]	175	26	201	587,568,000	279,535,000	867,103,000	57,249,000
Michigan	36	33	69	141,156,000	200,667,000	341,823,000	40,624,000
Minnesota	41	30	71	91,978,000	238,240,000	330,218,000	42,944,000
Mississippi	13	20	33	9,574,000	32,105,000	41,679,000	8,334,000
Missouri	121	34	155	153,759,000	134,588,000	288,347,000	22,558,000
Montana	16	3	19	24,444,000	4,293,000	28,737,000	3,466,000
Nebraska[4]	43	15	58	95,060,000	21,970,000	117,030,000	9,709,000
Nevada	1	1	2	138,000	5,152,000	5,290,000	1,045,000
New Hampshire[4]	25	2	27	23,887,000	22,092,000	45,979,000	5,345,000
New Jersey	475	18	493	528,840,000	56,974,000	585,814,000	69,098,000
New Mexico	12	7	19	11,004,000	16,445,000	27,449,000	4,061,000
New York	171	66	237	583,145,000	691,283,000	1,274,428,000	126,763,000
North Carolina	148	27	175	184,993,000	99,871,000	284,864,000	33,872,000
North Dakota	10	6	16	27,608,000	13,167,000	40,775,000	4,429,000
Ohio	479	131	610	1,237,753,000	710,719,000	1,948,472,000	133,453,000
Oklahoma	30	31	61	46,941,000	139,256,000	186,197,000	21,233,000
Oregon	6	21	27	48,233,000	68,158,000	116,391,000	9,544,000
Pennsylvania	784	116	900	531,476,000	423,704,000	955,180,000	90,359,000
Rhode Island	8	1	9	89,514,000	10,327,000	99,841,000	7,605,000
South Carolina	40	32	72	31,076,000	82,805,000	113,881,000	17,161,000
South Dakota	8	4	12	5,255,000	5,950,000	11,205,000	1,211,000
Tennessee[4]	3	36	39	677,000	131,978,000	132,655,000	18,330,000
Texas	62	84	146	155,892,000	166,831,000	322,723,000	47,071,000
Utah	13	6	19	47,728,000	26,017,000	73,745,000	8,135,000
Vermont[4]	8	2	10	3,720,000	12,126,000	15,846,000	1,637,000
Virginia	55	20	75	58,217,000	86,014,000	144,231,000	13,914,000
Washington	25	36	61	84,663,000	187,960,000	272,623,000	16,727,000
West Virginia	16	21	37	13,473,000	43,280,000	56,753,000	5,285,000
Wisconsin	113	40	153	224,414,000	96,584,000	320,998,000	39,036,000
Wyoming	2	9	11	2,262,000	15,835,000	18,097,000	2,756,000
Hawaii	6	1	7	17,033,000	6,584,000	23,617,000	3,042,000
Alaska	..	1	1	....	1,674,000	1,674,000	372,000
Puerto Rico	..	1	1	....	1,928,000	1,928,000	1,928,000
Total	4,485	1,508	5,993	$7,501,100,000	$7,103,892,000	$14,604,992,000	$1,538,303,000

[1] Data for state-chartered associations in Connecticut are as of September 30, 1949.
[2] Data for state-chartered associations in Maryland are estimated throughout tabular matter
[3] Data for state-chartered cooperative banks in Massachusetts are as of October 31, 1949.
[4] Data for state-chartered associations in Nebraska, New Hampshire, Tennessee, and Vermont are as of June 30, 1949.

NUMBER OF SAVINGS AND MORTGAGE LOAN ACCOUNTS, DECEMBER 31, 1949

State	Number of Savings Accounts			Number of Mortgage Loan Accounts		
	State	Federal	Total	State	Federal	Total
Alabama	5,873	26,477	32,350	3,945	16,170	20,115
Arizona	6,094*	16,578	22,672	1,989*	5,087	7,076
Arkansas	4,284*	19,285	23,569	2,819*	15,425	18,244
California	280,399	292,375	572,774	108,392	115,042	223,434
Colorado	20,588	45,601	66,189	8,280	18,287	26,567
Connecticut[1]	46,161	88,461	134,622	14,033	21,550	35,583
Delaware	9,927*	936	10,863	4,485*	327	4,812
District of Columbia	142,463*	53,328	195,791	42,598	11,498	54,096
Florida	6,551	161,821	168,372	2,760	48,990	51,750
Georgia	6,407*	87,514	93,921	3,707*	47,389	51,096
Idaho	703*	18,947	19,650	332	8,140	8,472
Illinois	403,601	388,724	792,325	129,193	96,321	225,514
Indiana	123,552*	164,122	287,674	56,123*	73,681	129,804
Iowa	47,731	40,914	88,645	23,531	19,515	43,046
Kansas	65,420	44,924	110,344	28,910	21,586	50,496
Kentucky	37,662*	93,026	130,688	18,695*	41,767	60,462
Louisiana	110,537	13,342	123,879	44,083	8,154	52,237
Maine	29,310	4,472	33,782	12,065	2,340	14,405
Maryland[2]	100,568*	98,495	199,063	31,285*	30,539	61,824
Massachusetts[3]	487,666*	173,892	661,558	141,007*	46,913	187,913
Michigan	87,487	117,599	205,086	30,601	38,653	69,254
Minnesota	47,258	140,712	197,970	20,505	45,805	66,310
Mississippi	3,967*	13,949	17,916	2,912*	9,686	12,598
Missouri	81,988	67,968	149,956	43,566	32,482	76,048
Montana	9,767*	1,714	11,481	5,280	1,082	6,362
Nebraska[4]	52,086	10,959	63,045	23,100	5,111	28,211
Nevada	24*	1,969	1,993	25*	788	813
New Hampshire[4]	18,068*	13,030	31,098	5,245*	4,481	9,726
New Jersey	589,664	63,600	653,264	99,387	8,921	108,308
New Mexico	6,616	7,305	13,921	3,104	4,270	7,374
New York	559,616	522,949	1,082,565	120,125	96,515	216,640
North Carolina	183,589	53,840	237,429	68,807	31,114	99,921
North Dakota	20,060	6,002	26,062	5,785	2,731	8,516
Ohio	1,110,200	476,118	1,586,318	471,753	139,160	610,913
Oklahoma	21,398	63,353	84,751	12,957*	36,223	49,180
Oregon	25,355	36,304	61,659	9,444	14,825	24,269
Pennsylvania	378,030	335,767	713,797	167,889	99,113	267,002
Rhode Island	83,881	8,125	92,006	18,868	1,941	20,809
South Carolina	16,027*	41,524	57,551	8,500*	24,672	33,172
South Dakota	3,771	3,477	7,248	1,477	1,773	3,250
Tennessee[4]	295	67,093	67,388	218	36,899	37,117
Texas	100,372	74,975	175,347	41,285	46,272	87,557
Utah	49,965*	28,297	78,262	9,291*	5,245	14,536
Vermont[4]	3,220*	5,733	8,953	796*	2,470	3,266
Virginia	29,534*	46,482	76,016	14,126*	20,925	35,051
Washington	70,902	137,878	208,780	15,245	36,355	51,600
West Virginia	5,326*	20,282	25,608	4,050*	12,686	16,736
Wisconsin	111,283	45,582	156,865	46,609	18,112	64,721
Wyoming	1,109*	8,232	9,341	575*	3,391	3,966
Hawaii	20,260	3,331	23,591	2,889*	953	3,842
Alaska	....	767	767	....	222	222
Puerto Rico	....	....	....	....	166	166
Total	5,626,615	4,258,150	9,884,765	1,932,646	1,431,763	3,364,409

[1] Data for state-chartered associations in Connecticut are as of September 30, 1949.
[2] Data for state-chartered associations in Maryland are estimated throughout tabular matter.
[3] Data for state-chartered cooperative banks in Massachusetts are as of October 31, 1949.
[4] Data for state-chartered associations in Nebraska, New Hampshire, Tennessee, and Vermont are as of June 30, 1949.
* Estimated.

borrower in periods of extraordinary family expense or in periods of reduced income on account of economic depression or otherwise. In recent years, savings and loan associations, and similar institutions, have made great progress by:

(1) Adjusting the loan payment more carefully to the family budget; (2) providing for even monthly payments until the debt is paid in full without renewal or other expense; (3) permitting prepayment so as to save interest, and to provide a breathing spell, so long as the loan is prepaid; (4) providing an automatic adjustment of interest rate so that the somewhat higher rate carried by a high percentage loan involving some risk is automatically reduced to a lower rate as the loan is paid off and the risk declines; (5) providing for additional advances by the lender to the borrower under the mortgage without expense and at a low rate to provide necessary funds for maintenance, repair and improvements, or other purposes; (6) waiver of a certain number of payments, usually up to six, after the loan has been reduced by regular payments for a specified period, usually three years; (7) provision for payment of taxes and insurance (sometimes including life insurance) upon a monthly basis; and (8) other special provisions for the accommodation of the borrower.

Such loans are customarily made up to 80 per cent or even 90 per cent of the value of the home in order to enable young families to acquire a home with a comparatively nominal cash payment. In spite of a few such high percentage loans, and with monthly amortization of all loans, the association is usually protected by first lien upon real estate which, in the aggregate, is about twice the unpaid balance of all loans.

In 1950, there was much discussion of the postwar home, the "package" home, which is complete, ready to live in, with some rather expensive equipment, such as electric or gas stoves, refrigerators, special furnaces and oil burners, much of which equipment was formerly considered to be chattels and not a part of the real estate. To enable the homeseeker to start off with such a complete home, plans were made to finance a high percentage of the total cost, including such equipment, with a low interest rate, monthly amortized,

Table 2—ESTIMATED AMOUNT OF MORTGAGE LOANS MADE BY SAVINGS AND LOAN ASSOCIATIONS IN THE UNITED STATES, 1925–1949

Year	Amount of loans made	Year	Amount of loans made
1925	$1,760,000,000	1938	$ 797,996,000
1926	1,945,000,000	1939	986,383,000
1927	2,110,000,000	1940	1,199,579,000
1928	2,153,000,000	1941	1,378,684,000
1929	1,850,000,000	1942	1,050,501,000
1930	1,300,000,000	1943	1,183,961,000
1931	900,000,000	1944	1,454,000,000
1932	530,000,000	1945	1,913,000,000
1933	435,000,000	1946	3,584,492,000
1934	462,800,000	1947	3,810,800,000
1935	641,540,000	1948	3,607,000,000
1936	754,997,000	1949	3,636,000,000
1937	896,579,000		

Table 3—CONSOLIDATED STATEMENT OF CONDITION ALL SAVINGS AND LOAN ASSOCIATIONS AND COOPERATIVE BANKS, DECEMBER 31, 1949

Assets	Amount	Percentage of total	Percentage change from Dec. 31, 1948
Cash on hand and in banks	$ 874,750,000	6.0%	+32.9%
Government bonds	1,496,649,000	10.2	+ 2.6
Mortgage loans and real estate contracts	11,750,482,000	80.5	+11.9
Real estate owned [1]	13,110,000	0.1	−45.5
All other assets	470,001,000	3.2	+ 9.8
Total	$14,604,992,000	100.0%	+11.8%

Liabilities	Amount	Percentage of total	Percentage change from Dec. 31, 1948
Savings and investment accounts	$12,558,861,000	86.0%	+13.3%
Borrowed money [2]	490,966,000	3.4	−18.6
All other liabilities	446,424,000	3.0	+ 8.4
General and unallocated reserves [3]	1,108,741,000	7.6	+14.2
Total	$14,604,992,000	100.0%	+11.8%

[1] Excludes office buildings.
[2] Includes advances from FHL banks.
[3] Includes insurance reserve, excludes specific reserves.

flexible type mortgage suited to the family budget and to many of the ups and downs of family life.

The prevailing home mortgage rate in the United States in 1905 was about an average of 6 per cent per annum or less, in 1925 an average of 7 per cent per annum or more, and in 1950 approximately 5 per cent per annum. Many loans were made in 1950 at 4 per cent per annum or less.

The savings and loan business in 1950 consisted of about 6,000 associations, 4,500 operating under state charter and 1,500 under federal charter, with nearly 10,000,000 members owning nearly $15,000,000 of invested capital. They carry the home financing for 3,300,000 American families. All of these home loans are amortized monthly by a payment which pays all interest and some principal each month, leading to debt-free home ownership.

About 3,800 of these associations, representing about 85 per cent of assets, are members of the Federal Home Loan Bank System, which provides them with convenient short-term credit and long-term credit to assure more continuous normal functioning at all times in all areas of the country. About 2,800 of them, representing about 70 per cent of the assets, are members of the Federal Savings and Loan Insurance Corporation for the insurance protection of savers and investors. Federal savings and loan associations are required to have such membership. State associations may have such memberships upon application and qualification.

These associations in recent years have made about 33 per cent of the home loans recorded in the United States. This is to be compared with about 25 per cent of such loans made by commercial banks and trust companies, 5 per cent by mutual savings banks, and 8 per cent by insurance companies. In recent years the associations have had an excess of savings and investment funds over and above their mortgage loan requirements and are carrying an average of about 5 per cent in cash and 15 per cent in government bonds.

It now appears that nearly all of these associations will shortly have their savings accounts and investments insured to $10,000 for each customer by Federal Savings and Loan Insurance Corporation, a permanent government corporation, similar to the situation in the United States where nearly all commercial banks and trust companies have their accounts insured to $10,000 for each customer by Federal Deposit Insurance Corporation, a similar government corporation. These associations are growing at the rate of about 15 per cent per annum in volume of savings and are rapidly gaining recognition as savings institutions throughout the United States and its territories and possessions.

While about 70 per cent of the loans made by these savings institutions are conventional, monthly amortized, home mortgage loans without any government assistance, they are also amongst the principal mortgage lenders, making government guaranteed and insured loans to veterans, and loans insured by Federal Housing Administration to the general public.

Table 1 indicates the number of such associations, their assets, and number of savings members and borrowers. Table 2 indicates estimated amount of mortgage loans made by such associations from 1925 to 1949. Table 3 is a consolidated statement of condition of such associations. These statistics are taken from "Savings and Loan Annals, 1950," published by United States Savings and Loan League, Chicago 1, Illinois, and are based upon official reports and estimates.

HORACE RUSSELL,
Member, Chicago Bar.

SAVINGS BANK. See BANKS AND BANKING.

SAVINKOV, sä'vyĭn-kôf, **Boris Viktorovich** (pseudonym ROPSHIN), Russian politician: b. Vilna, Lithuania, 1877; d. Moscow, 1925. While a student at St. Petersburg he became a Social Democrat. Arrested, he was deported to Vologda where he met Brechkovska, "grandmother of the Russian Revolution," who converted him to revolutionary socialism. He escaped to Switzerland and, after organizing a series of terrorist assassinations including that of Grand Duke Sergius (1905), was again arrested, and sentenced to death. A second time he escaped to Switzerland (1906). After the revolution of February 1917 he was appointed vice minister of war in Kerensky's second coalition government of August. The Bolsheviks set a price on his head, but he continued to fight them in Poland, where he established the opposition paper *za Svobodu,* and later in Paris. Apprehended by the Ogpu while secretly attempting to re-enter Russia, he was condemned to death with commutation of the penalty to 10 years' imprisonment. He was reported to have committed suicide in prison. Savinkov was the author of the terrorist novels *The Pale Horse* (1909) and *That Which Never Happened* (1913).

SAVIOUR, Order of the. See BRIGITTINES; ORDERS, RELIGIOUS.

SAVOFF, sä'vôf, or **SAVOV, Mikhail,** Bulgarian general and statesman: b. Eastern Rumelia, 1857; d. Vallier-de-Thiey, France, July 22, 1928. Educated at Robert College, Constantinople, the military school at Sofia and the Russian General Staff Academy at St. Petersburg, he won a brilliant reputation in the war with Serbia (1885). Twice minister of war (1891–1897 and 1903–1908) he commanded the army in the First and Second Balkan Wars (1912–1913). He urged the World War I alliance with the Central Powers but was denied a command. After less than a year as Bulgarian minister to France, he retired in 1923.

SAVONA, sä-vō'nä, Italy, in the Province of Genoa on the west coast of the Riviera, 26 miles southwest of Genoa, is one of the most important towns of that region. It is picturesquely situated amid vine-clad hills and orange groves. The Castle of Saint George (1542) is now a military prison; the other buildings deserving notice are a Renaissance cathedral, with the magnificent tomb erected by Sixtus IV to his parents; the Della Rovere Palace, now occupied by municipal officers; other churches, a lyceum, a technical and a commercial institute, other educational institutions, a fine theater, and a large hospital. It is a center of the iron industry, having foundries of all kinds, besides glassworks, potteries, tanneries, brickyards, and sulphur mills. It is an important seaport. Its chief imports are coal, petroleum, iron, cereals, and the exports consist of tomatoes, wood and candied fruits. The harbor, which is good, is defended by a fort. Pop. (1936) 64,199.

SAVONAROLA, Girolamo, jē-rō'lä-mō sä'vō-nä-rō'la, Italian religious reformer: b. Ferrara, Italy, Sept. 21, 1452; d. Florence, May 23, 1498. As a boy he was well acquainted with mediaeval learning and his family intended that he should become a physician, but a disappointment in love turned his thoughts to the church, and in 1475 he left home secretly and joined the Dominican order. After passing a severe novitiate in the monastery at Bologna he was made a teacher there, and in 1482 was sent to Saint Mark's monastery in Florence where he became disgusted at the corruption in church and state, and began to attack the abuses in his sermons. His first success as a preacher was at Brescia in 1484–1485. He fascinated the worldly Italians by his terrible denunciations of vice and wickedness, and returned to Florence with a reputation as a popular preacher. In 1490 he was made *lector* in Saint Mark's, and crowds came to hear him. A year later he was chosen prior of Saint Mark. Though his convent had been favored by Lorenzo de' Medici, Savonarola refused to do homage to him, as was customary. Lorenzo tried in vain to conciliate the friar who continually preached against the abuses in state and church. In 1492, Lorenzo de' Medici, the chief opponent to the work of Savonarola in Florence, died. In the political confusion that followed, and during the invasion of Italy by Charles VIII of France, Savonarola by his public services acquired great influence among the Florentines. He desired a democratic government for Florence, and, when in 1494 the people drove out the Medici, he opposed the schemes of the aristocracy to seize the government, called a mass meeting of the citizens and practically assumed the dictatorship of Florence, superintending the formation of a government in which the people were to fear God and amend their conduct, and prefer public to private interests. A general amnesty was proclaimed, and a council modeled on that of Venice was chosen to administer the government. There was no doge as in Venice, but for three years Savonarola was dictator. His enthusiasm for liberty, his zeal in religion, and his eloquent sermons, caused light-hearted, pleasure-loving Florence to become a city of Puritans. Thomas Aquinas and the Old Testament furnished the spirit of the laws. Though not of the Renaissance and hostile to its spirit, especially to the pagan influence derived from the classics, Savonarola was not an enemy to learning and fine arts, though in 1497 he encouraged committees of children and devotees to search the city for frivolous books, cards, profane songs and music, and works of art of evil tendencies, which were destroyed under the direction of the government. No good books or works of art were destroyed at this time, though the next year many were lost in a second "burning of the vanities." Savonarola aimed at reforming the church in the same caustic way. With his moral reforms he closely knitted political schemes and doctrines, and several times preached vigorously against Pope Alexander VI, who first tried to conciliate him. Savonarola spurned his advances, and in 1496 was ordered to cease preaching, and to undergo a trial for heresy. Silent for a time Savonarola was attacked by the Franciscans and began again to preach. In 1497 he was excommunicated and Florence was threatened with an interdict if she harbored him. For a year he defied excommunication and demanded that a general council be called to depose Pope Alexander. But he had presumed too much upon the support of fickle citizens. Many were weary of

the Puritan rule and longed again for the flesh pots of Egypt; the other cities of Italy were hostile to Florence because of her course during the French invasion and because of her democratic government; there had been famine and pestilence, which Savonarola had been unable to alleviate; some of the followers of the Medici had been executed and thus powerful enemies made; and now Florence was threatened with an interdict. Savonarola had to be guarded by armed followers when he went to preach. In 1498, while still powerful, he in a sermon had called upon Heaven to consume him with fire if he had acted from unchristian motives. A friar of the Franciscan order thereupon offered to pass through the ordeal of fire with Savonalora, who treated the offer with contempt. But the Dominicans volunteered to undergo the ordeal to show their faith in Savonarola, and after hesitation, which his enemies made the most of, Savonarola consented to the judgment by ordeal, believing in Divine intervention in his favor. The fires were made ready and the opposing champions seemed ready to enter the flames, when the Franciscans, who had no intention of carrying out the judgment by ordeal, began to raise disputes to cause delay. They insisted that the Dominicans must not bear the crucifix nor the host through the flames. Savonarola would not agree to give up the latter and the dispute lasted until a rain came and gave the Franciscans an opportunity to slink away. But upon Savonarola was blamed the failure of the ordeal. The populace was infuriated because they had missed the show, and called Savonarola an impostor who was afraid of the ordeal. Florence turned against him; he was arrested, accused of heresy and after six days' torture and a hasty and unfair trial, was condemned to be hanged and then burned. The sentence was carried out with all the refinements of cruelty. Savonarola was a powerful, typical mediævalist, hostile to many of the manifestations of the Renaissance spirit. His talent for political organization was profound, but he was mistaken in thinking the Florentines capable of self-control in politics or of puritanism in religion. The Italian despots understood the people better than Savonarola, and only as a despotic leader was Savonarola himself to any degree successful. His ideals were those of an ascetic, uncompromising, rigid. An eloquent speaker, he, for a time, imposed his ideals upon the Florentines, who when weary of being good, left him to his enemies. Of a mystical turn of mind, he attached great importance to dreams and visions which he related in his sermons. The writings of Savonarola were voluminous, embracing sermons, essays and poems on religious subjects, and a treatise on the government of Florence.

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SAVONNERI TAPESTRY. See TAPESTRIES.

SAVOU, sä-voo', **SAVOE,** or **SABOE,** an island of the Asiatic Archipelago in the Indian Ocean, near the islands of Timor and Sandalwood. It covers an area of 237 square miles. The surface is elevated in the centre, sloping seaward. It is well-watered and fertile, yielding millet, corn, beans; tropical products as usual in this latitude, including betel, cinnamon, mangoes, cotton, tobacco, etc. Domestic animals are numerous, besides buffalo, wild boars and deer. Horses and tobacco are the chief exports, sent to Timor. The island consists of five principalities, subject to the Dutch government of Timor. The inhabitants are Malays — a strong race with pagan practices, including dog sacrifices. Pop. 16,000.

SAVOY, House of. The territory of Savoy formed part of ancient Gaul, and from 122 B.C. to 407 A.D. was in possession of the Romans, by whom it was divided into two provinces, the Graian and Pennine Alps. At the latter date it was seized by the Burgundians, but with Burgundy it became subject to the Franks in 534, was included in the Carlovingian empire, and on its dissolution in 887 was granted by the Diet of Tribur to Rudolph, king of Transjurane Burgundy, and with that kingdom was united to Cisjuran Burgundy or Arles. On the accession of the last king of Arles to the imperial throne as Conrad II in 1027, the more powerful nobles of northwestern Italy, such as the Marquis of Susa, the Counts of Maurienne, Turin and Chablais, became vassals direct of the emperor. Umberto Blancamano, Count of Maurienne, was the first of the family who took a prominent place among the princes of northern Italy. His nephew, Amadeus II (1060–80), in right of his mother, Adelaide, heiress to the Marquisate of Susa, added nearly the whole of Piedmont to the original possessions of his house. Humbert II, his son and successor (1080–1103), further increased his dominions by the conquest of Tarantasia. Amadeus III (1103–49) received from the Emperor Henry V the title of Count of Savoy in 1111; and his grandson, Thomas I (1188–1233), who supported Frederick II in his contest with the popes, obtained important accessions in Chambéry, Turin, Vaud and other lordships. Amadeus IV (1233–53), like his father a warm adherent of the emperor, obtained the submission of the city of Turin to his rule, and ceded Piedmont to one of his brothers, Thomas, Count of Maurienne. He was suc-

ceeded by Boniface (1253–63), and Boniface by his uncle, Peter (1263–68), who reconquered Turin, which had rebelled. His nephew, Amadeus V (1285–1323), now mounted the throne; he assisted Philip the Fair in his war against Flanders, and accompanied the Emperor Henry VII to Italy. His grandson Amadeus VI aided the Greek emperor, John Palæologus, against the Turks and the Bulgarians and accompanied the pretender Louis of Anjou, in his expedition to Naples. His son, Amadeus VII (1383–91), forced the Count of Provence to cede to him Nice and Vintimiglia. Amadeus VIII, grandson of the preceding (1391-1451), received the ducal title from the Emperor Sigismund in 1416, acquired the county of Geneva, together with Bugey and Vercelli, and re-annexed Piedmont. Louis, who on the abdication of his father had governed as regent, assumed the title of duke in 1440. The elder male line becoming extinct in 1496, the crown devolved on the nearest collateral heirs, Philibert II (1496–1504), and his brother Charles III (1504–53). The latter aided the Emperor Charles V against Francis I of France, and after losing Valais and Geneva, which joined the Swiss Confederation in 1533, and the canton of Vaud, seized by the Bernese in 1536, he was finally deprived of all his territories by the French king. But his son Philibert Emmanuel, surnamed the Iron Head (1553–80), commander-in-chief of the Spanish army, succeeded in gaining back the greater part of the paternal domains by the treaties of Câteau-Cambrésis (1559) and Lausanne (1564). In 1560 he was induced by the courts of Rome, Spain and France to attempt the conversion of the Waldenses by force, but they offered such vigorous resistance to his troops in several encounters that he granted them, under certain conditions, the free exercise of their religion (5 June 1561). Charles Emmanuel I (1580–1630) was defeated by Henry IV of France, who invaded Savoy and Piedmont. His son Victor Amadeus I speedily regained the possessions his father had lost, and added to them Montferrat, Alba, and some other places, surrendering to France in exchange Pignerol, La Perouse, Angrone and Lucerne. His younger brother Thomas was the founder of the line of Savoy-Carignan. Victor Amadeus II (1675–1730), grandson of the first of that name, at the beginning of the war of the Spanish Succession, sided with France; but bribed by brilliant offers, allied himself to Austria by the Treaty of Turin, 25 Oct. 1703. The victories of the Duke of Vendôme compelled him to retire to Genoa, but the defeat of the French under the walls of Turin by Prince Eugene (7 Sept. 1706) restored his possessions. In 1709 he severed the Austrian alliance, and remained neutral until the end of the war. By the Treaty of Utrecht (1713) he received a part of the duchy of Milan, with the island of Sicily, which conferred upon him the title of king. In 1720 he was compelled to give up Sicily to Austria in exchange for Sardinia, which with Savoy, Piedmont and his other continental dominions, were erected into the kingdom of Sardinia. Consult Wiel, 'The Romance of the House of Savoy' (1901).

SAVOY, Military Order of. See ORDERS, ROYAL.

SAVOY, or **SAVOIE,** sä-vwä, France, consists of two eastern departments, Savoie and Haute-Savoie, formed in 1860 out of the former duchy of Savoy, one of the states of the Sardinian monarchy (q.v.); it covers an area of 4,162 square miles (2,388 in Savoie and 1,774 in Haute-Savoie), and is exceedingly mountainous. The region is separated from Switzerland by Lake Geneva and is dominated by Mont Blanc, the loftiest peak of the Alpine chain, whose many ramifications extending in all directions present a relief of successive mountains and valleys. Savoy belongs to the Rhone basin, which forms its western boundary. The other rivers are the Arve, Isère and Arc. The chief lakes besides Geneva are those of Bourget and Annecy. The climate is, generally speaking, cold. Savoy is rich in mineral waters, of which the most famous are those of Aix-les-Bains (hot-sulphur), Marlioz, Challes (strong natural sulphur), Salins-Montiers (hot, saline, various minerals), Brides-les-Bains (soda, calcium). The extent of arable ground is limited, but a scarcity of grain is supplied by the chestnut which forms a staple food among the peasants and the poor. The vine is somewhat cultivated in the lower valleys and slopes. The main source of profit is in the cattle and dairy produce, as hay and pasture alone are obtained from much of the land. The forests, which cover vast mountain slopes, also afford a rich supply of timber. The minerals are not sufficiently exploited to be of any importance. The manufactures are coarse woolens, linen and cotton goods, felt hats, leather and hardware. Other industries are silk, tanning and weaving. There is an important transit trade carried on between France and Italy, by way of Mont Cenis. Coal, skins, cotton, provisions are imported; cattle, dairy produce, wood, stones, mineral waters, silk goods, tanned leather and paper are exported. There are some schools, all speak French and they are exclusively Roman Catholic. The University Academy is at Chambéry, and clock-making is taught in two special schools at Annecy, employing 2,000 hands. (Here is also a large cotton mill). The inhabitants are industrious, honest, hospitable and intelligent; their chief characteristic, however, is love of country. Though often compelled to leave their homes for winter employment, wandering through France, Switzerland, Spain, or Italy, in order to earn a livelihood, they return to their native mountains at the earliest moment. Sardinia ceded Savoy to France in 1860. It was formed into the two departments of Savoie and Haute-Savoie, whose capitals are respectively, Chambéry and Annecy. Pop. Haute-Savoie 252,794; of Savoie about 235,544; total, 488,338.

SAVOY CABBAGE, a variety of cabbage (q.v.) with many sub-varieties, forming large close heads with wrinkled leaves, and cultivated for winter use, requiring a light, rich soil.

SAVOY CONFERENCE, a conference held in 1661 at the Savoy Palace, London, between a number of Church of England and Presbyterian divines for the purpose of "advising upon and reviewing the Book of Common Prayer; and of taking into serious consideration the several directions and rules, forms of prayer, and things in the same book;

of consulting also upon the several objections which shall now be raised against the same; and, if occasion need be, to make such necessary and reasonable alterations, corrections and amendments as shall be agreed upon to be needful and expedient for the giving satisfaction to tender consciences, and the restoring and continuing of peace and unity in the churches under his majesty's government and protection.» When the Parliamentary cause triumphed in the civil war of 1642–46 the majority of the clergy, who were royalists, were either turned out of their pulpits and their places were filled by Presbyterians, then a strong body in England; and at the Restoration of Charles II a large number of the ministers connected with the church strongly objected to Episcopalian order and practice being again introduced. The government was fully aware of this state of matters, and it was accordingly resolved that the determination of all matters appertaining to the establishment of unity should be left to the advice of a national synod. On 25 March 1661, therefore, the letters-patent above quoted from were issued, appointing 12 bishops, with nine clergymen as assistants on the Episcopal side, to meet with an equal number of Presbyterian divines and discuss the matters therein mentioned. The commissioners met for the first time on 13th April. Sheldon opened the discussion by observing that the Episcopal party, being perfectly satisfied with the established forms of worship, had nothing to propose, and would therefore expect that any objections to the existing order of things, and any innovations that might be desired, should be mentioned by their opponents. The Presbyterians moved that Bishop Ussher's Reduction of Episcopacy, a scheme in which the elements of the Scotch system of presbyteries, synods and general assemblies were combined with distinctions of ecclesiastical ranks, should be laid down as a ground-work to treat upon. They further offered several exceptions to the liturgy, against the many responses of the people, and desired that all might be made one continued prayer. They objected to lessons being taken out of the Apocrypha, and wished that the psalms used in the daily service should be according to the new translation. They excepted to many parts of the baptismal service that infer the doctrine of the regeneration of the baptized. They also moved that the practice of kneeling at the Lord's Supper, and that the use of the surplice, the cross in baptism, of godfathers as sponsors, and the celebration of the holy days, should be abolished. It was urged in reply to the demand for the adoption of Ussher's scheme, that the king's commission gave them no power even to take into consideration any questions relating to the government of the church; and the Presbyterians proceeded to discuss the minor points, mainly the alterations in the liturgy. Baxter undertook the preparation of what was called a Reformed Liturgy, but the Episcopalian commissioners rejected it at once, without examining it. The two parties finally separated at the end of four months, the period assigned by the letters-patent, without coming to a single resolution, and the government passed in the following year the famous act of uniformity, the stringent clauses of which drove about 2,000 clergymen from the Anglican Church.

SAVOY DECLARATION, the document uttered by the Independents and Presbyterians who met at the Savoy Hospital in London 29 Sept. 1658. In it these religionists declared the principles of their faith and polity. The Declaration is substantially the same as the Westminster Confession. See CONFESSION OF FAITH, WESTMINSTER.

SAVORY, aromatic herbaceous or half-shrubby plants of the labiate genus *Satureia,* native to the Mediterranean region and the Levant. They are cultivated in kitchen gardens. Summer savory (*S. hortensis*) is an annual with slender branching stems nearly a foot high, bearing soft, lanceolate leaves, often stained with purple, and with lilac or white mint-like flowers in the axils. The young shoots are plucked at flowering time, and dried for flavoring dressings, etc. Winter savory (*S. montana*) is a perennial species, with similar qualities.

SAW-FISH, a ray of the family *Pristidæ,* so called from the sword-like snout, the sides of which are armed with spines, so as to give it the appearance of a large doubled-toothed saw. Armed with this formidable weapon, which may measure two or three feet or more in length, the saw-fish is said to attack even whales, and to inflict severe injuries upon them, while it is certainly destructive to shoals of small fishes upon which the saw-fish subsists. The true teeth of the mouth are small, blunt, and arranged pavement-like. The mouth is situated on the under surface of the head, and the breathing apertures are large and set behind the eyes. The fins, tail and granular scales are shark-like in most respects. About five species are known, all inhabitants of the open ocean, whence they seldom approach the shore; and they perfer warm waters. A common species on the Gulf Coast of the United States is *Pristis pectinatus,* which sometimes enters the lower Mississippi or wanders northward on the Atlantic Coast; it is 10 to 20 feet long. The *Pristisphoridæ,* which bears a similar weapon, are sharks.

SAW-FLIES, insects of the family *Tenthredinidæ,* so called because the ovipositors are constructed of parallel, toothed blades with which the females cut holes in vegetable tissue to receive their eggs. Unlike the wasps, bees, ants and other members of the order *Hymenoptera,* the abdomen is united by its full girth to the thorax; that is, it is sessile. In general they resemble other members of the order in having two pairs of transparent wings with rather few veins and cells, biting mouth-parts, and a complete metamorphosis. The larvæ resemble caterpillars, but have at least six pairs of prolegs instead of five as do the larvæ of lepidopterous insects. They are also frequently slimy, and often they keep part of their bodies curved beneath the edge of the leaf upon which they are feeding. All feed upon living vegetable tissue, and some are troublesome upon cultivated plants. The currant-worm or slug (*Pteronus ribesii*), a yellow bodied European insect, whose black-dotted green larvæ appear shortly after the leaves in spring, eat gluttonously for about three weeks and transform to adults below the ground. Two or three broods may appear in a season. The pear slug (*Eriocampoides lamacina*) is a slimy larva which sometimes

damages pear foliage. Rose slug, grape slug, raspberry slug, turnip fly and willow saw-fly are other well known species which occasionally do damage. In such cases they have been combated with an insecticide (q.v.) which must be eaten, though in some cases dust, forcible spraying with water, and other remedies have been reported effective.

SAW-MILL, a complete sawing machine, with all its adjuncts, for converting logs into planks, boards and slabs. The earliest form was the sawpit with raised trestle horses upon which the log was raised and then sawed by hand saws or by whip saws. Windmill power was applied about the beginning of the 13th century and was soon followed by water power.

All attempts to establish saw-mills in England during the period of 1660–1770 were unsuccessful on account of the opposition of the hand sawyers; but in the United States, beginning with the erection of the mill at Piscataqua Falls in the State of Maine in 1634 a vast number of mills have been built in all of the wooded districts of the country and by the development of improved methods in handling the logs, and in arranging the machinery, have made such States as Maine, Michigan and Wisconsin famous as lumber producing areas.

Of these mills the earlier forms are known as gate or sash saw-mills and consisted of two upright guide posts held in position by a transverse beam at the top. A heavy rectangular wooden frame carrying a straight band saw attached to the top and bottom pieces, worked with a vertical reciprocating motion in slides between the guide posts. The reciprocating motion was imparted to the sliding frame by a connecting rod, the lever end of which extended to one end of a water-wheel shaft. The carriage bearing the log was moved by a rack and pinion arrangement operated by a feed-wheel and the log was fed endwise to the saw, which was run, usually, at a speed of 150 strokes per minute and was capable of producing from 500 to 2,000 superficial feet of lumber per day of 10 hours.

A larger output was obtained by introducing the "gang" feature, which consisted of attaching several saws to the sliding frame. In the "Yankee gang," the saws were arranged in two sets, with the tooth edges of one set facing in a direction opposite to that of the other set, and enabled the sawing of two logs at one movement of the carriage. Other forms, designated "slabbing gang," "stock gang" and "pony gang," applied the method to special purposes.

The "muley" saw followed the gate and gang saws and was adopted generally by the smaller mills on account of the great reduction in the weight of the reciprocating parts. In this arrangement, the ends of the saw are attached to two light cross-heads opposite each other, which oscillate up and down. The saw is kept in line by means of slides working in a strong iron frame swung from an overhead beam. The cutting is accomplished entirely by the downward motion, during which the action of the slides causes the saw-teeth to hug close to the wood and then recede from it during the upward motion, so as to reduce the friction. Muley saws are driven at a speed of about 300 revolutions of the driving wheel per minute and are capable of turning out about 6,000 superficial feet per day.

Saw-mills employing circular saws are of comparatively recent date. The experimental point in the use of the circular saw as the main saw of a mill was passed about the middle of the 19th century, since which time it has been developed to a state of very high efficiency and general usefulness. By its use a continuous cutting motion is obtained and driven by engines ranging from 25 to 100 horse power circular saws in connection with steam feeding arrangements are capable of sawing from 20,000 to 100,000 superficial feet per day, practically limited only by the capacity of the handlers to remove the lumber.

The saw, which is a disc of steel with a toothed edge, is mounted on a shaft which is rotated by gear wheels, or by belts operated by the shaft of a water wheel, steam engine, etc. The cutting depth of the saw is somewhat less than half the diameter of the disc and the saws generally employed rarely exceed a maximum diameter of six feet on account of the increased thickness required to obtain rigidity, and the consequent increase in the amount of the kerf or cut waste. Water power was used almost exclusively until 1835, but it has been almost completely supplanted by steam engines. "Band saws," although known a great many years before the circular saw, were not adopted until recent years on account of the difficulty experienced in making saws of sufficient endurance to withstand the severe service. During recent years, however, these difficulties have been overcome and they are now generally used in all of the great lumber producing countries.

The mechanical arrangement consists of two broad-faced wheels mounted one above the other. Over these wheels, a continuous band of steel, which is the saw, works like a belt over two pulley wheels, with a continuous motion, and the logs are fed endwise against the cutting or toothed edge by a traveling carriage. Mills employing band saws are capable of producing from 40,000 to 80,000 superficial feet of lumber per day and require from 25 to 45 per cent less driving power than mills employing circular saws. The latest thing in band saw-mills is a portable mill in which the log is stationary and the band saw, toothed on both edges, travels in guides lengthwise of the log, dropping the thickness of a board at each traverse and sawing at both the forward and return movements.

Many saw-mills employ both circular and gang saws. Both ordinary blade and band-saws are run in gangs and some band saws run on wheels as large as 10 feet in diameter. The mill is usually built upon the banks of a river or pond. The general construction is quite simple and consists of a saw floor and log deck built at an elevation of about 10 or 12 feet above the water level. A jack ladder constructed of heavy timber with its lower end resting on the bottom of the stream, leads up to the saw floor at the rear end of the mill. Ribbons of iron are fastened to the top sides of the ladder and form the track upon which the log car is operated. The arrangement and installation of the saws vary according to the size of the mills and the kind of work that is done. Since the depth of cut is less than

three feet, usually in mills handling logs of large diameter, increased depth of cut is obtained by mounting two saws one above the other, so that they cut in the same line — the upper one cutting down from the top of the log to the cut of the lower or main saw. In the mills in California, logs measuring up to 10 feet in diameter are sawed by arranging four saws one above the other, some cutting horizontally and others vertically, thus permitting the handling of very large trees.

The gigantic trunks of the redwood trees of California, Washington and other States on the Pacific Coast, ranging from 10 to 25 feet in diameter, are first quartered by explosions of gunpowder and then passed through the mills.

One great disadvantage in the use of circular saws is the excessive kerf waste, which is fully 20 per cent greater than that resulting from the use of the band or the gang saws, and is one of the principal reasons for the employment of the last named forms in the smaller mills where the uniform character of the lumber and the saving of raw material are important factors.

The majority of the American mills use single circular saws, but many of them have saws installed upon each side of the mill floor, and the logs are rolled to either side by the log jack placed in the centre of the building. In addition to these rotaries, the larger mills have from one to four gang saws.

The arrangements for handling the logs which are floated down upon the rivers from the distant forests to the mills, consist of piles driven at convenient distances apart, into the bed of the river adjacent to the mill, to which strong "booms" of logs, are attached by heavy chains and serve to hold the logs as in a pen, until they are required and also to leave a free channel in the middle of the stream. When the mill is in operation, the boomed logs are drawn from the water by an endless chain which runs in a V-shaped log slide and is provided with spikes to prevent the log from slipping back. The logs follow each other in endless succession. When a log reaches the log deck, it is loaded upon the skids by the action of a lever operated by the sawyer, which causes a pair of arms to rise through the mill floor and raise the log forcibly upon the skids. The skids lead to the log carriage, upon the "head blocks" of which the log is securely fastened by the insertion of a "dog," and it is then ready to be advanced to the saw. This is accomplished in several different ways — by rack and pinion worked by "cone feed," consisting of two parallel cones operating a belt which regulates the motion of the pinion shaft; by "rope feed," consisting of a wire rope which passes over pulleys set in the floor to a drum underneath, and is so arranged as to be under the control of the sawyer in the forward movement of feeding, or in the reverse movement of returning the carriage to its original position; or by "steam feed," commonly termed "lightning feed," derived from the force of a steam cylinder about 10 inches in diameter, which is laid upon the mill floor underneath the saw carriage to which the piston is attached. As the log is fed and when the first slab has been removed, the sawyer touches a lever and brings the "nigger," a piece of iron-bound timber with spikes upon its front face, through the floor. The spiked face catches the side of the log and turns it axially at once, to any desired position. If the log is being "canted," or prepared for the gang saw, the slabs are removed from the two opposite sides, a hook is thrown over the rear end of the cant so as to prevent it from returning with the saw carriage, and it is dropped upon a set of rollers which starts it toward the gang. From the time that the log is drawn out of the water and until it emerges from the gang, all of the operations are performed by machinery.

The finished product of saw-mills are beams, planks, boards, etc., of varying sizes in length, breadth and thickness, too numerous to enumerate specifically; laths, consisting of strips four feet in length, three-eighths inch in thickness and one and one-half inches in width, used for lath and plaster work. In 1914, according to the Federal Census of that year, there were 27,229 saw mills operating in the United States. In 1937 the number of establishments reporting lumber and lumber products was 7,647, the number of wage earners 323,928, and the value of products, $848,481,000. The number of active sawmills was over 16,000, and the production 24,354,884 thousand b.f.

For technical description of saws see SAWS AND SAWING; METAL-WORKING MACHINERY, and WOOD-WORKING MACHINERY.

SAW-WHET OWL, a small American owl (*Nyctale acadica*), which takes its name from the rough tone of its cry. It is northerly in its distribution, ranging across the continent, but rarely dwelling as far north as Hudson Bay. It is not so large as a robin and has inconspicuous ear-tufts; bill black; cere tumid; general color: above, chocolate brown, streaked with white; below, white with brown stripes. Its food consists mainly of insects and its nest is made in a hollow of a tree, in an old crow's nest or any convenient place. Compare SPARROW-OWL.

SAWBILL, a motmot (q.v.).

SAWDUST, a general name given the accumulated particles caused by sawing wood, stone, etc. Besides the more common uses of sawdust, it is commercially valuable as the basis of various manufactures. Oxalic acid is manufactured on a large scale from wood sawdust. Sawdust is also used in the "carbonating" stage of the process for the manufacture of soda ash. The sawdust of mahogany and rosewood is used in dressing furs and the small fragments of some woods, such as the pencil cedar, made by saw cuts or the turning tool, yield perfumes. Sawdust sinks in water, though the wood from which it is cut floats.

SAWS AND SAWING. A saw is a tool consisting usually of a thin, flat blade of highly tempered steel serrated or having a series of triangular-shaped teeth usually on one of the edges, but sometimes on both edges. It is one of the most important of the various forms of cutting tools and is extensively used for working wood, metal, stone and other substances, but principally wood.

Saws are made in a great variety of forms and sizes in order to adapt them to the varying characteristics of the material worked and to suit them to the particular kind of work for which they are used and also to suit the circumstances attending the manner in which they are operated or handled.

For illustration of power-driven saws see WOOD-WORKING MACHINERY.

In this article the consideration of the subject will be confined to the construction and adaptation of the various makes of saws for

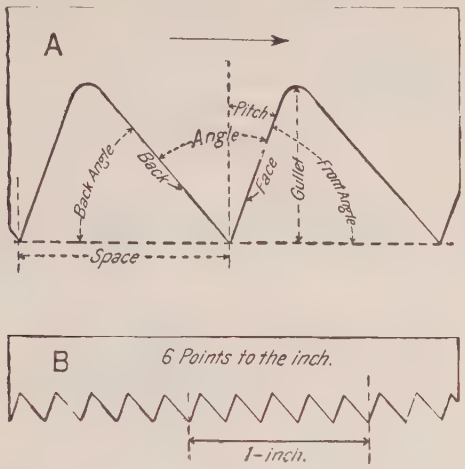

FIG. 1.

specific purposes and to the identification of their generally applied trade names with those purposes.

The characteristic action of the saw being the removal successively of minute portions of the material worked by the cutting or tearing action of a series of sharp edges thrust against the material indicates that it is essentially a tool adapted for cross-cutting or cutting at right angles to the fibre of the material. Necessity and custom, however, have compelled its application for ripping or cutting with the grain also, thus adapting it to work which otherwise would be accomplished by the use of cutting tools such as axes and chisels. These conditions define two primary classes of saws — the cross-cut saws and the rip-saws which divide all the dif-

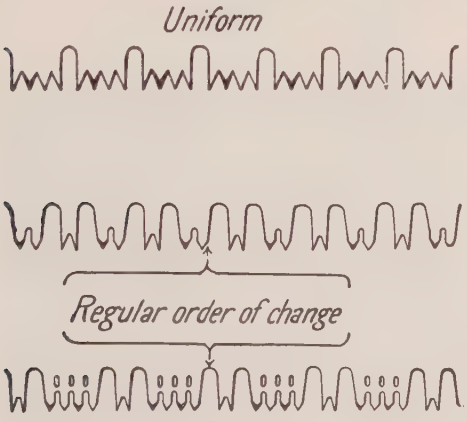

FIG. 2.

ferent kinds of saws into two groups according to the general purposes for which they are used.

Saw Terms.— The principal terms used in describing a saw are as follows: (See Fig. 1, Diag. A).

Space.— The distance between two contiguous teeth, measured from point to point.

Pitch or Rake.— The inclination of the face of a tooth or the angle of the face of a tooth measured from a vertical line drawn through its point.

Gullet.— The depth of the tooth from the point to the root-line, the throat. Also the concave space at the back of a tooth.

Gauge.— The thickness of the blade, usually measured by the wire gauge.

Set.— The amount of lateral inclination

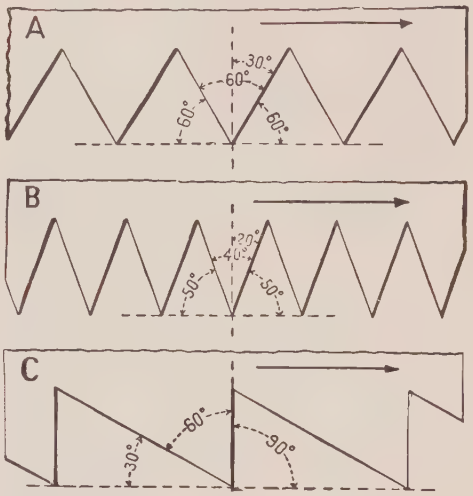

FIG. 3.

given to the teeth, either to the right or to the left of the plane of the blade, in order to produce a kerf or cut of sufficient width to effect a proper clearance of the sawdust and to prevent the saw from binding or being pinched by the sides of the cut.

Fleam.— The side angle of a tooth.

Points.— The number of teeth points to an inch. The coarseness and fineness of saws are usually estimated by the number of points instead of the number of teeth to an inch, and it should be observed that there is always one less tooth per inch than there are points. (See Fig. 1, Diag. B).

The several parts of a saw-tooth are usually described by the following terms: (See Fig. 1, Diag. A).

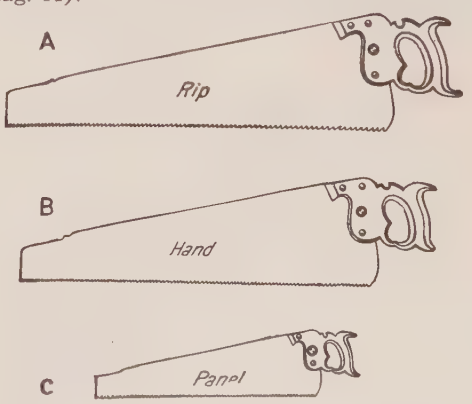

FIG. 4.

Face.— The front or cutting edge of the tooth.

Back — The following or back edge of the tooth.

Point.— The lower end of the V between

saw-teeth; in another sense the outer cutting extremity.

Saw-teeth vary in spacing, length or depth of gullet, angle, pitch, set, fleam and form of

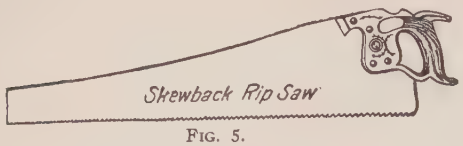

FIG. 5.

gullet. The teeth may be uniform throughout, or the blade may have several different kinds of teeth. In the latter case all the teeth of a kind are made uniform, or they are arranged in a regular order of change. (See Fig. 2).

The "angle" of a saw-tooth is that which is included in its point between the face and the back. The generic angle is 60 degrees, but it varies in the different kinds of teeth from 45 degrees to 70 degrees, according to the character of the material worked and the specific purpose for which the saw is used. The angle suitable for cutting soft wood and for ripping purposes is always more acute than that used for cutting hard wood and for cross-cutting. For soft wood, the front angle varies from 65 degrees to 70 degrees; for hard wood

FIG. 6.

from 80 degrees to 85 degrees. In saws employed for cutting very hard knotty wood, and in those used for cutting metal, the teeth are arranged in a series of equilateral triangles, the pitch of each tooth being evenly divided between the front and the back. In saws used for a general line of work, the angle usually adopted is 40 degrees, with the pitch evenly divided. In saws used for cutting soft woods and for ripping purposes, an effective placing of the angle is attained by making the face upright, and sloping the back. (See Fig. 3, Diags. A, B. C, respectively). The pitch of a saw tooth is obtained by subtracting the back angle from the front angle. These terms and rules apply generally to all the different kinds

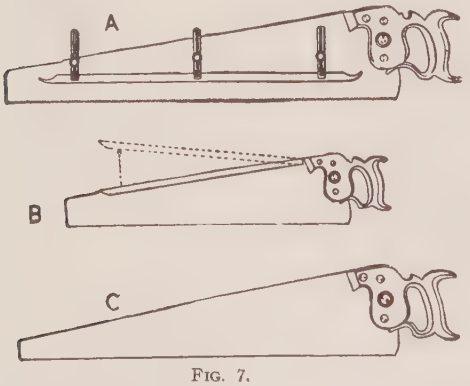

FIG. 7.

of saws from the smallest hand and machine saws used by jewelers, machinists and carpenters, to the largest power-driven saws employed in the various classes of saw mills.

The various kinds of saws manufactured and used at the present time are of the following named general types:

The rip-saw, the hand-saw and the panel-saw. (See Fig. 4).

The carpenter's hand-saw for miscellaneous work is usually made from 20 to 30 inches in length, and is used for the common work of sawing material of moderate thickness both longitudinally and crosswise. The rip-saw and the panel-saw are modifications of the hand-saw, from which they differ in the size of the teeth, and in the length of the blade. The rip-

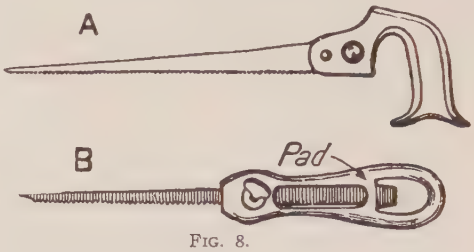

FIG. 8.

saws range from 28 to 36 inches in length, and the panel-saws from 12 to 24 inches. The usual spacing of the teeth of the three types is as follows: Hand-saws, 5 to 12 points per inch; rip-saws, three to five points at the heel or handle end, and six to eight points per inch at the point; and the panel-saws, 8 to 12 points to the inch. All three forms are made with a straight upper edge, or a "skewback" curve as shown in Fig. 5. A novel and useful form is represented by the "combination" saws. These are graduated along the upper edge, and sometimes furnished with a level attachment as

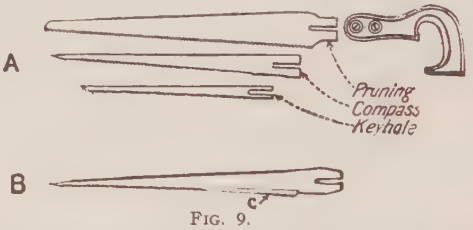

FIG. 9.

shown in Diag. A, Fig. 7. Other useful modifications of the hand-saw are the gauge-saw, the ship-carpenter's saw, and the movable-back saw, shown by Diags. A, B, C, respectively, of Fig. 7. The gauge-saw is equipped with a movable attachment by means of which it may be adapted to tenoning, shouldering, curving, cog-cutting or to any other purpose where a definite depth of cut is required. The movable-back saw combines the advantages of a thin-bladed hand-saw and a first class back-saw. The ship-carpenter's saw has a very long narrow blade and is especially suitable for cutting sweeps or curves of long radius. It is handled like the rip-saw, and is extensively used by cabinet-makers, pattern-makers and others for work requiring a narrow saw.

The compass-saw and its modifications, the various form of keyhole-saw, which are also commonly known as pad-saws and socket-saws, are shown in Fig. 8, Diags. A and B, respectively. The blades of the compass-saws range from 10 to 20 inches in length, and taper from one-eighth inch at the point to two or more inches at the heel. They are used for cutting

curves and sweeps by hand and are sometimes called table-saws. The regular keyhole-saw and its modification, the pad-saw, are simply smaller forms of compass-saws, and are used for cutting curves of small radius, such as keyholes and other small holes in the central

Fig. 10.

portions of work. A saw of this type consists of a narrow blade which slides into a hollow handle or pad, to which it is secured in place by one or more set screws, only so much of the blade being drawn out as may be required by the character of the work. These saws are made both simply and in "nests." A nest of

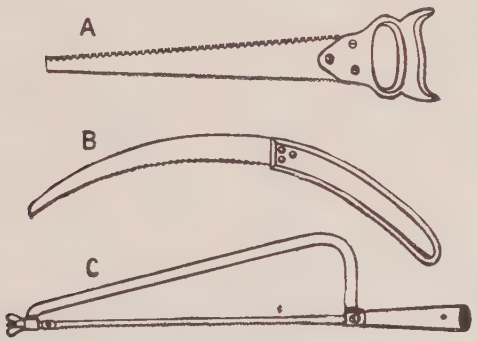

Fig. 11.

saws consists of a handle and three interchangeable blades, one each of the keyhole or pad, the compass and the table or pruning-saws. (See Fig. 9, Diag. A). A very useful novelty in this line is the nest of saws designed for cutting square holes. In this combination, the keyhole and compass blades are fitted with an attach-

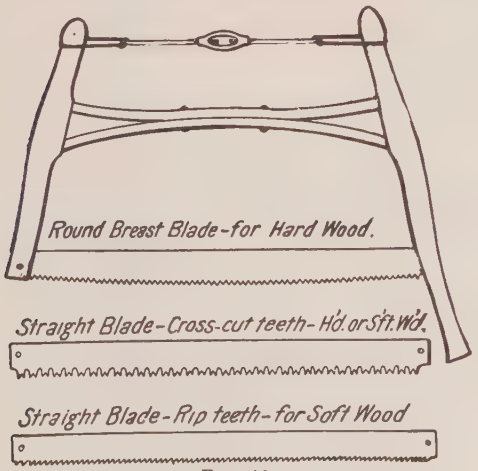

Fig. 12.

ment at right angles to the plane of the blade as shown at (C) Diag. B, Fig. 9.

The back-saws are a class of hand-saws characterized by deep thin blades stiffened with a metallic back as shown in Fig. 10. The principal forms are the mitre-box saw, the tenon-saw, the sash-saw and the dovetail-saw. The last named has the thinnest blade, so thin that simple filing gives the teeth sufficient set. The blades of the others are somewhat thicker and require a slight amount of set. All back-saws are best used in a mitre box or in some other form of guide rest. In cutting, they should be held firmly with the least practicable expenditure of force in controlling their direction, and the cut should be commenced by placing the heel of the blade on the farthest edge of the work and then drawing the saw steadily toward the body of the operator. Back-saw blades range from 8 to 18 inches in length,

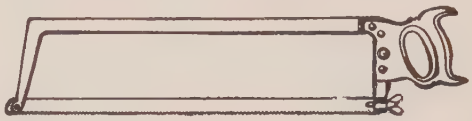

Fig. 13.

the number of teeth varying in number from 10 to 14 per inch.

The pruning-saws are of several kinds, the principal forms of which are shown in Fig. 11. They vary from a large form of compass saw to straight saws toothed on both edges as shown in Diag. A, and also to those with curved blades as shown in Diag. B, a form extensively used on the Pacific Coast. They are also made of narrow blades attached to metal frames, the shape of which produce a tapered combination which permits of the use of the saw in very narrow spaces. See Fig. 11, Diag. C.

The construction of the tapered pruning-saw places it on the dividing line between what may be termed the regular bladed saw and the frame saw. In the former, the pressure on the cutting edge is resisted by the rigidity of the blade itself, while in the latter the pressure is resisted by the distribution of the tension of the blade through the various parts of the frame. Of the frame saws, the most familiar are the wood-saws shown in Fig. 12, the butchers' saws shown in Fig. 13 and the hack-saws shown in Fig. 14. The last named is shown in its adjustable and extendable form, in which the frame may be lengthened or shortened to fit blades of varying length. The saw has a thin, narrow blade and equilateral triangular-shaped teeth. It is stretched between the upright portions of a wrought-iron or steel frame, the

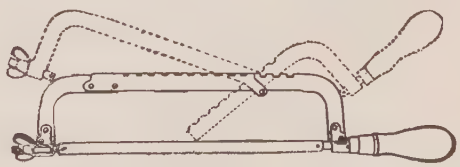

Fig. 14.

requisite tension being imparted by means of a thumb-screw at the forward end. A handle is attached to the back end of the frame, which is usually grasped by the right hand of the operator, and the downward pressure imparted to the tool during the act of cutting by laying the left hand upon the back or top of the frame. This saw is extensively used by fitters and mechanics for cutting odds and ends of metal, and has now become one of the most important tools in a machinist's toolbox. For general work, the blades are made with 14 teeth to the inch, but those used for cutting tubing and thin metal are

usually made with a greater number of teeth, about 25 per inch, in order to prevent a free bite and to reduce the danger of stripping the teeth. As in the case of the file, the fineness of the bite depends upon the number of the teeth in contact with the work; therefore, the judgment of the operator usually determines the amount of pressure that should be applied to the saw to suit the varying conditions of the cut. As in the case of other cutting tools, experience teaches that a hack-saw will work more effectively under a pressure sufficient to make the tool bite freely, than when it is allowed to scrape and glaze the surface under a light pressure. In order to use a hack-saw properly, the blade should be strained in the frame to prevent its kinking, and the cutting strokes should be made uniformly at a rate not exceeding 40 per minute. The blades should

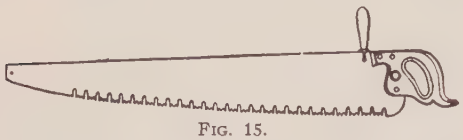

FIG. 15.

be as short as possible, so as to reduce the cost and the danger of breakage, and oil should *never* be used on the teeth as it decreases their cutting efficiency. The reverse is true in the case of wood-working saws. Hack-saw blades as regularly manufactured range from 6 to 18 inches in length. Those longer than eight inches for hand-saws and 12 inches for power-driven saws are seldom required. The rail-saw is a modification of the hack-saw, the height of the frame being increased to adapt it for large work, such as the cutting off of rails, large beams, girders, etc., and is found to be a very valuable tool for contractors. The frames are fitted to carry blades ranging from 9 to 18 inches in length.

The cross-cut saws employed for cutting timber and other large work are made in an almost innumerable variety of forms and sizes both as to the blades and to the teeth. The "one man" saws, shown in Fig. 15, range from three to six feet in length. The particular saw illustrated has the famous "Great American" tooth, commonly known as the M tooth. Fig. 16 shows three forms of the larger saws. They range from 4 to 10 feet in length and are operated by two men, one at each handle. They are made with either curved or straight backs, but are always round-breasted, and differ in this respect from the drag- and pit-saws, in which the toothed edge is always straight.

Other saw terms are defined as follows: Arbor, the shaft, spindle or mandrel of a circular saw; crown-saw, the end of a cylinder having saw teeth arranged to cut out a round hole, called also a cylinder- or drum-saw; jump-saw, a circular saw made adjustable in up-and-down position; razor-saw, a hardened steel toothless wheel made thin for cutting stone, etc.; ring-saw, a band-saw set on guides to operate in a ring or circle; saw-back, the stiffening piece on the back of a band-saw; saw-bench, a bench fitted with guides, gauges, stops, clamps, fences, etc., for supporting and guiding work to be sawed; saw-gate, a frame in which gang-saws are set to stiffen them and prevent buckling, a similar device is termed a saw-hanging; saw-jointer, a mechanism for holding in position the blades of gang-saws while they are filed and set; saw-jumper, a device for spreading or setting saw-teeth; saw-table, the level surface on which the work is fed to a circular or band-saw that cuts through a gap in the table; saw-wrest, levered device for straining a saw-blade in giving the teeth a spring-set. The saw industry of the United States is mainly confined to about 80 factories, having 4,384 employees. In 1937 these produced a gross value of $19,853,034, but more than a third of this was the value of the steel and other materials used. The industry more than doubled its production between 1914 and 1925. Illinois is

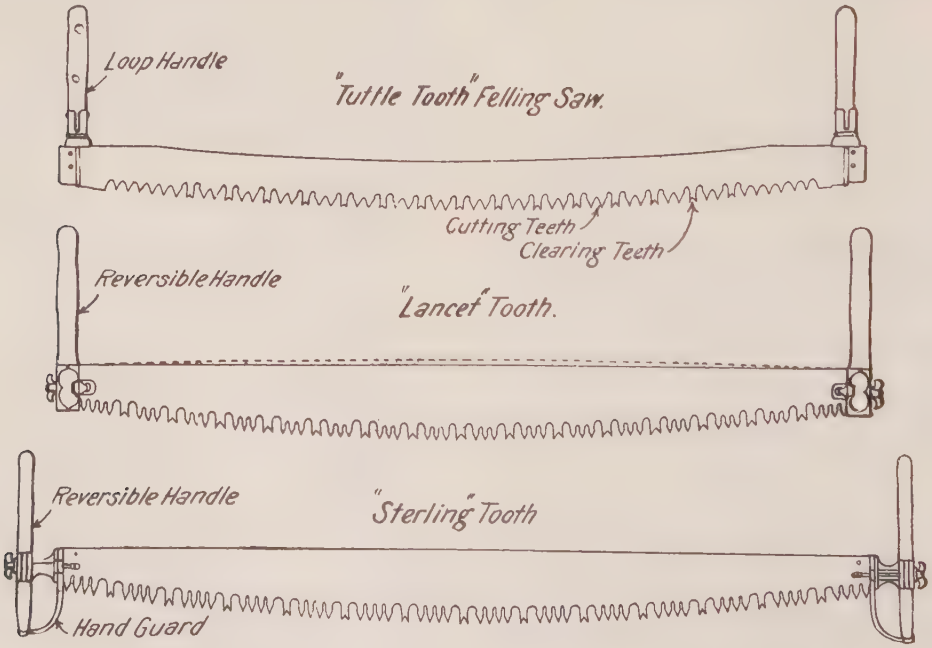

FIG. 16.

the leading state, followed by New York. See also Wood-Working Machinery; Lumber Industry in the United States.

SAWYER, Charles, American public official: b. Cincinnati, Ohio, Feb. 10, 1887. He obtained degrees from Oberlin College in 1908, and from Cincinnati University in 1911. After serving in the army in World War I, he practiced law in Cincinnati and entered politics. He was lieutenant governor of Ohio in 1933–1934, and from 1936 to 1944 was a member of the Democratic National Committee. In 1944–1945 he served as ambassador to Belgium and minister to Luxembourg. On May 6, 1948, he became secretary of commerce. On resigning in 1953 he returned to his law practice in Cincinnati, and became a director of the Kennecott Copper Corporation.

SAWYER, Leicester Ambrose, American clergyman and Biblical scholar: b. Pinckney, N. Y., July 28, 1807; d. Whitesboro, N. Y., Dec. 29, 1898. He was educated at Hamilton College, studied at Princeton Theological Seminary, and in 1832 entered the Presbyterian ministry. He became president of Central College, Ohio. In 1854 he withdrew from the Presbyterian denomination and joined the Congregationalists. He made a complete translation of the Bible, published between 1858 and 1891.

SAWYER, Philip, American architect: b. New London, 1868; d. New York, May 21, 1949. After serving with the United States Geological Survey, he studied architecture at Columbia University, the Beaux Arts in Paris, and in the office of McKim, Mead and White. He formed the firm of York and Sawyer, in New York. Among the important buildings designed by him are the federal buildings at Honolulu, the Children's Village at Dobb's Ferry, the New York Historical Society Building, the Federal Reserve Bank of New York, the First National Bank of Boston, and buildings for Vassar, Smith, Rutgers and other colleges. He served as consulting architect for the Board of Water Supply of New York, and for the departments of Commerce and Labor.

SAWYER, Sylvanus, American inventor: b. Templeton, Mass., April 15, 1822; d. Fitchburg, Mass., Oct. 13, 1895. His attention was early turned to invention, and in 1839 he engaged in business with his brother-in-law in Augusta, Me., and invented a steam engine, a screw propeller and a car run by foot power. His first big invention, however, was the machine for making chair cane from rattan, invented in 1843 and used in his factories after 1850. Sawyer then turned his attention to gun and rifle projectiles and made important inventions, his projectiles making the rifled cannon a practicality. In 1853 he invented an arrangement by which shells would explode on impact, by use of percussion caps. These inventions were put into use and did great service against the Confederacy in the Civil War. Other inventions, after the war, perfected the cast-steel rifled guns, the first battery of which he furnished. His other inventions include calipers and dividers, a steam generator, a sole sewing machine, and a centering watchmaker's lathe.

SAWYER, Thomas Jefferson, American Universalist clergyman: b. Reading, Vt., Jan. 9, 1804; d. Medford, Mass., July 24, 1899. He was graduated at Middlebury College in 1829, and held pastorates in New York (1830–1845 and 1852–1861). Between these periods he served as principal of the Liberal Institute of Clinton, N. Y., in which he also taught theology. He was one of the founders of Tufts College, Medford, Mass., where he became professor of theology. As an advocate of Universalist doctrine and as a scholarly controversialist he acquired a wide reputation. His discussion with Isaac Westcott was published under the title of *The Doctrine of Eternal Salvation* (1854).

SAXE, Comte (Hermann) Maurice de, marshal of France: b. Dresden, Oct. 28, 1696; d. Chambord, near Blois, France, Nov. 30, 1750. He was a natural son of Augustus II, elector of Saxony and king of Poland. His military career was begun at the age of 12, and a few years later he was put in command of a cavalry regiment which took part in the war with Sweden. After the Treaty of Utrecht he attached himself to the French Army and in 1720 was made camp marshal to the duke of Orléans. He was offered the command of the Saxon Army at the death of his father but chose to remain in the French service. For his defense of Alsace in 1743 he was created marshal of France. Thomas Carlyle has described his heroic conduct in the Battle of Fontenoy, in his life of Frederick the Great. He was one of the most fearless but also one of the most dissolute men of his day. He wrote with a singular disregard of the rules of orthography a book on the art of war, entitled, *Mes Rêveries* (1891–1893).

SAXE, săks, **John Godfrey,** American poet: b. Highgate, Vt., June 2, 1816; d. Albany, N. Y., March 31, 1887. He was graduated at Middlebury College and admitted to the bar in 1843. During 1850–1856 he conducted the *Sentinel* at Burlington, Vt., and in 1856 became attorney general of Vermont and deputy collector of customs. He moved to Albany, N. Y., where he edited the *Evening Journal.* He was a conspicuous figure on the lecture platform and at scholastic anniversaries, where he often read his verse. His reputation as a humorous poet was considerable during the mid-century, his verses often appearing in *Harper's Magazine* and in the *Knickerbocker.* He published several volumes of light verse, including *Progress, a Satirical Poem* (1846); *Fables and Legends of Many Countries* (1872); and *Leisure Day Rhymes* (1875).

SAXE-ALTENBURG, SAXE-COBURG, SAXE-MEININGEN, and **SAXE-WEIMAR,** săks-äl′tĕn-bo͝orĸ, -kō′bûrg, -mī′nĭng-ĕn, -vī′mär, former German duchies of Thuringia. From the 13th century these territories had belonged to the margraves of Meissen, who in the person of Frederick I the Warlike, a member of the Wettin family, became electors of Saxony as well. In 1485 the Wettin family divided its possessions. The elder brother Ernest received the Wittenberg lands, on which the electoral dignity rested, and Thuringia; Albert was given the margravate Meissen with Dresden and Leipzig. (See Saxony, German electorate and kingdom.) The protection of Luther and the cause of the Reformation brought the Ernestine line into conflict with Emperor Charles V, who, supported by Duke

Maurice of Saxony, defeated and captured Elector John Frederick in 1547. The Wittenberg lands and the electoral dignity were given to Maurice and remained thereafter with the Albertine line. John Frederick, assuming the title of a duke of Saxony, was confined to the rule of Thuringian territories. Since no laws of primogeniture were established until late in the 18th century, these territories experienced a series of partitions, reunions, and redivisions, which reached an end only on May 1, 1920, when most of the Saxe territories and the principalities of Reuss and Schwarzburg formed the state of Thuringia within the German Empire. In 1945 this state became part of the Soviet occupation zone, but ceased to exist as such when all states in the German Democratic Republic were dissolved in 1952.

The division of the Thuringian lands began after the death (1554) of Duke John Frederick who had taken his seat in Weimar and had founded the University of Jena as a center of orthodox Lutheranism. In 1554 his four sons partitioned the duchy into the four duchies of Weimar, Gotha, Coburg, and Altenburg. One of the sons of Duke John of Weimar was the renowned general of the Thirty Years' War, Bernhard of Weimar (1604–1639). With the expiration of the lines of Coburg, Gotha, and Eisenach by 1640, their lands came to the sons of Duke John. Ernest I the Pious, of Gotha-Coburg, also inherited Altenburg in 1672, but his possessions were divided after his death in 1675 among his seven sons. William, an elder brother of Ernest the Pious, ruled Weimar and Eisenach, which his heirs split into Saxe-Weimar, Saxe-Jena, and Saxe-Eisenach. But in 1741 a reunion took place under Duke Ernest Augustus I of Weimar, who finally bound his succession by a law of primogeniture. The duchy (from 1815 a grand duchy) of Saxe-Weimar-Eisenach retained its territorial identity thereafter. It received some small additional territories at the Congress of Vienna.

Saxe-Coburg passed after the death of Ernest the Pious of Gotha-Coburg to his son Albert and in 1699 to Albert's younger brother Duke John Ernest of Saxe-Saalfeld whose descendants retained Coburg until 1918 and Saalfeld until 1826. A redivision of territories belonging to the branch of the Ernestine line, begun with Ernest the Pious, took place in the latter year. Frederick I, eldest son of Ernest the Pious, had received in 1679 Gotha and Altenburg, which remained under the rule of his descendants to the expiration of the line in 1825. Ernest III of Saxe-Coburg-Saalfeld gave Saalfeld to Saxe-Meiningen and received Gotha, thereupon calling himself Duke Ernest I of Saxe-Coburg-Gotha. His brother Leopold in 1831 became king of the Belgians, and his younger son Albert became consort of Queen Victoria of England. After the death of his son Ernest II in 1893, a son of Queen Victoria, Alfred, duke of Edinburgh, assumed the government, followed in 1900 by his nephew Charles Edward, who abdicated in November 1918. When Gotha joined the new state of Thuringia, Coburg went to Bavaria.

In 1826 the ruler of Saxe-Hildburghausen, a duchy which had also existed since 1679, ceded his territory to Saxe-Meiningen and became duke of Saxe-Altenburg, the easternmost of the Saxon duchies located in the hills and valleys of the Saale and Pleisse rivers, while Saxe-Meiningen was farthest to the west along the Werra River. Of the four Saxon duchies existing after 1826—Saxe-Weimar-Eisenach, Saxe-Coburg-Gotha, Saxe-Altenburg, Saxe-Meiningen—all but the last sided with Prussia in the struggle for German unification. Saxe-Meiningen joined Austria in the war of 1866 and was occupied by Prussian troops. Its Duke Bernhard was forced to abdicate in favor of his son George II who, with all the other Saxon dukes, joined the North German Confederation and subsequently the German Empire.

The largest and most important of all the duchies was Saxe-Weimar-Eisenach. From 1741 it consisted chiefly of two major sections: the region around Eisenach at the northwestern tip of the Thuringian Mountains, and the Weimar-Jena territory covering the north-central slope of these mountains. The duchy became world famous when in the second half of the 18th century its ruler, Duke Charles Augustus (r. 1758–1828), brought to its capital city, Weimar, and to the University of Jena the leading spirits of the great German civilization of the age. Christopher Martin Wieland, Johann Gottfried von Herder, Friedrich von Schiller, and Johann Wolfgang von Goethe spent their best years in Weimar, while the University of Jena attracted, apart from Schiller, philosophers of the rank of Friedrich W. G. von Schelling, Georg W. F. Hegel, Johann Gottlieb Fichte, and Jakob Friedrich Fries. In 1816 Grand Duke Charles Augustus was one of the first German princes to give his country a constitution and grant complete freedom from censorship. It was from Saxe-Weimar-Eisenach that the national movement of German students, the German *Burschenschaft,* took its origins. Weimar also remained under Charles Augustus' successors a center of German arts. It was often referred to as the capital of German culture in contrast to Potsdam as the capital of Prussian-German power politics. Such considerations contributed to the choice of Weimar as meeting place of the German Constituent Assembly in 1919, which drafted the constitution of the first German republic.

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SAXIFRAGE, săk'sĭ-frĭj, a plant of the *Saxifraga* genus of the family Saxifragaceae, the name arising from an old Roman notion that the plants, which they often saw growing in cracks in rocks, had split the rocks themselves, and applying the doctrine of signatures, they concluded that the saxifrage would also break up stones in the bladder. The many species of saxifrage are found chiefly in the north temperate and Arctic zones, increasing in number northwards; they are also characteristic of sub-Alpine and Alpine floras. This northern and mountain habit has made them

Saxifrage: *Saxifraga oppositifolia.*

valuable for rock gardening, especially as the Alpine species have comparatively large flowers. The species are easily propagated by stolons and offshoots. Saxifrages are closely allied to the Rosaceae, and have numerous regular flowers, mostly in corymbs or panicles, and white, yellow, purple or pink in color. The individual flowers are generally small, five-parted, with a two-celled ovary, becoming a small two-beaked pod with many seeds.

The London pride (*Saxifraga umbrosa*) is much cultivated in European gardens, and sends up from a rosette of thick glabrous leaves small pink and white flowers panicled on a stem nearly a foot high. The purple saxifrage (*S. oppositifolia*) is one of most widely distributed species of Alpine and Arctic floras, and one of the first to bloom. It extends as far southward in the United States as Vermont, and carpets the rocks with its evergreen mats of thick foliage, nearly covered with solitary lilac blossoms. The most familiar saxifrages in eastern America are *S. virginiensis* and *S. pennsylvanica*. The former is one of the first spring plants to bloom. It grows in rock crevices and begins to open its small white flowers, while they are still close to the rosette of spatulate leaves. As the spring advances, the naked, pubescent flower scape elongates until, in fruit, it is perhaps a foot high and branched in a loose panicle. *S. pennsylvanica* is a little later in blooming, larger, and frequents swamps and wet banks; it has greenish white, purple, or rarely white flowers in panicles, and oval to oblanceolate leaves.

SAXO GRAMMATICUS, săk'sō gră-măt'ĭ-kŭs, Danish historian: b. about 1150; d. Roeskilde, Denmark, ?1220. He was a native of Denmark, of which kingdom and its dependencies he compiled history down to 1186 under the auspices of Archbishop Absalon of Lund, whose secretary he appears to have been. This work, *Historia Danica* or *Gesta Danorum,* is written in good correct Latin, which Erasmus praised, and occupied 20 years in its composition. Saxo chose as his models the later Roman historians, especially Valerius Maximus, yet in some of his expressions and in his mode of representation he is quite medieval. The work is divided into 16 books, the earlier of which give a highly colored and imaginative account of ancient Danish history as learned from tales and traditions and is full of living pictures of old heroic wars and adventures; the first nine books can scarcely be looked upon as reliable history, but when the writer approaches his own time his history is of the greatest value.

SAXONS, săk'sŭnz (Ger. SACHSEN), name of a Teutonic tribe first mentioned in history by the geographer Ptolemy in the 2d century A.D. They were settled in the southern part of the Cimbrician Peninsula, supposedly present-day Schleswig. From here they advanced during the 3d and 4th centuries beyond the Elbe and Weser rivers. Some of the Saxons, together with the Angles, after a long period of marauding raids, migrated in the 5th and 6th centuries to England. (See ANGLO-SAXON.) The remaining Old Saxons, as those on the Continent were called, expanded in the meantime throughout a considerable part of northwestern Germany. The Elbe and Saale rivers were the boundaries of their eastward extension, in the south they bordered on the Hessians and Franks, and in the west the Rhine north of the Lippe formed the border. Only along the coast of the North Sea the Friesians maintained themselves as a separate tribe.

The Saxons were composed of four major groups: Westphalians, Angrarians (Engerns), Eastphalians, and (in Holstein) Nordalbingians. They conducted continuous warfare with the Franks. After a long series of bloody wars (772–804), Charlemagne subjugated and forced them to accept the Christian religion. Bishoprics were founded in Bremen, Verden, Minden, Münster, Paderborn, and Osnabrück, subsequently also in Hildesheim and Halberstadt. The Saxons continued to live under their own laws which Charlemagne had collected and which formed a corpus called the *Lex Saxonum.*

HAJO HOLBORN.

SAXONY, săk's'n-ĭ (Ger. SACHSEN, zäk'sĕn), early German duchy in the northwestern area of Germany, inhabited in the 3d century A.D. by the Germanic Saxons (q.v.). With the dissolution of Charlemagne's empire in the 9th century, there emerged the tribal duchy of Saxony which combined the low-German territories between the Rhine and the Elbe rivers. Saxony was one of five German tribal or "stem" duchies into which the East Frankish Empire tended to dissolve. Otto, son of a Saxon noble named Liudolf, was named the first duke of Saxony (r. 880–912), and in 908 acquired Thuringia also. His son Henry the Fowler (r. 912–936) was elected German king (Henry I) in 919, thus establishing the line of Saxon Holy Roman emperors: Otto I (r. 936–973), Otto II (r. 973–983), Otto III (r. 983–1002), and Henry II (r. 1002–1024).

In 960 Otto I gave the duchy to a relative, Hermann Billung, who extended it eastward, though his authority was largely restricted to the northern parts. After the expiration of the Billung dynasty in 1106, Count Lothair of Supplinburg became duke of Saxony. After becoming emperor (Lothair II) in 1125, he gave the duchy to his son-in-law, Henry the Proud, duke of Bavaria, a member of the Guelph family. But in 1138, Emperor Conrad III took the duchy from Henry and bestowed it on the Ascanian margrave of Brandenburg, Albert the Bear. Henry the Lion, son of Henry the Proud, refused to acknowledge the Ascanian claim and in 1142 was again granted the duchy. He extended the Saxon power as far as the Oder and the Baltic Sea. But simultaneously he became the most powerful opponent of the universal aspirations of the Hohenstaufen or Ghibelline emperors. (See GUELPHS, OR GUELFS, AND GHIBELLINES.) His struggle with Emperor Frederick I resulted, in 1180, in the loss of all his fiefs.

Saxony was divided: Cologne received the duchy of Westphalia; other territories went to the archbishops of Bremen and Magdeburg and the bishops of Osnabrück, Paderborn, Minden, Hildesheim and Halberstadt. The counts of Oldenburg, Lippe, and Holstein were made imperial princes. The Guelph dynasty retained only the lands of Brunswick and Lüneburg, in the center of the old tribal duchy of Saxony, popularly called Lower Saxony. In subsequent centuries, Brunswick-Lüneburg emerged as the most important state, its rulers becoming electors of Hannover in 1692. Only in 1946 were the major parts of the old Saxon duchy united again in the State of Lower Saxony (Niedersachsen), one of the nine states forming the Federal German Republic.

The Ascanians received Lauenburg and the country around Wittenberg on the Elbe, which were the only parts of the former duchy which retained the name Saxony and the ducal title. The Golden Bull of 1356 raised Saxony-Wittenberg to an electorate of the empire. Upon the expiration of the Ascanian line of Saxony-Wittenberg, Emperor Sigismund gave the electorate in 1423 to Frederick I the Warlike, a member of the Wettin family. As margrave of Meissen and landgrave of Thuringia, Frederick ruled the lands to the south. (See also SAXONY, electorate and kingdom.)

HAJO HOLBORN.

SAXONY, German electorate and kingdom. The main part of the state of the Wettin dynasty was the march or mark Meissen (Misnia), the land north of Bohemia, west of Silesia, east of Thuringia, and south of the old Saxony and Brandenburg. In the 13th century the margraves of Meissen became landgraves of Thuringia as well. Frederick I the Warlike, who founded the University of Leipzig in 1409, acquired in 1423 the duchy of Saxony-Wittenberg which gave him the rank of elector. Soon the name Saxony was applied also to the region formerly called Meissen. His grandsons, Ernest and Albert, divided the territories between them in the Leipzig partition of 1485. Ernest received most of Thuringia, Saxony-Wittenberg, and the electoral title, while Albert as duke of Saxony ruled Meissen and northern Thuringia. Elector Frederick III the Wise (r. 1486–1525) founded in 1502 the University of Wittenberg, from which in 1517 Luther's reformation started. Frederick and his successors, John the Constant (r. 1525–1532) and John Frederick (r. 1532–1547), protected Luther's precepts against the decrees of the church and Emperor Charles V. The emperor defeated and captured John Frederick in the Schmalkaldic War of 1546–1547. The Ernestine line of the house Wettin lost Wittenberg and the electoral title; both went to Duke Maurice of the Albertine line who was an ally of Charles V, though in 1552 he led the rebellion of German princes which blocked the plans of religious and imperial restoration forever. The Ernestines remained confined to Thuringia. In the absence of strict laws of primogeniture they divided their territories into a number of duchies of which (apart from the largest, Saxe-Weimar) Saxe-Altenburg, Saxe-Coburg, and Saxe-Meiningen were historically significant. (See SAXE-ALTENBURG, SAXE-COBURG, SAXE-MEININGEN, AND SAXE-WEIMAR.)

The historical role of Saxony in the 16th century was to a large extent made possible by the advanced economic development of the region. It was then one of the chief mining regions of the world (silver, copper, precious stones, tin, and salt) and a center of textile industries. Under Elector Augustus (r. 1553–1586), Saxony received an excellent administration from which Leipzig especially profited in its rise as the great emporium of central Germany.

During the Thirty Years' War, Saxony fought first with Gustavus Adolphus of Sweden against the German emperor, Ferdinand II, but in 1635 concluded the Treaty of Prague, and as a consequence suffered much devastation by Protestant armies in the years thereafter. After 1648 the rise of absolutism proved irresistible. At the same time the court developed great luxury which reached its height under Frederick Augustus I (known as Augustus the Strong, r. 1694–1733), who made Dresden one of the most beautiful baroque cities on the Continent. (The architectural monuments of that epoch were mostly destroyed by air attacks in the last days of World War II.) Augustus the Strong, after joining the Roman Catholic Church, also became king of Poland in 1697. Saxony lost thereby the leadership of the Protestant princes of northern Germany, which honor fell to the rising Brandenburg-Prussia. The Polish ambitions forced Saxony to side with Austria and she suffered severely in the wars of Frederick II of Prussia (r. 1740–1786), whose highest, though unfulfilled, ambition was the conquest of Saxony.

In the Napoleonic Wars, Elector Frederick Augustus III (r. 1768–1806) joined France after the defeat of Prussia in 1806–1807. Enriched by Prussian territory and raised to king of Saxony as Frederick Augustus I the Just (r. 1806–1827) he became a member of the Confederation of the Rhine (q.v.). Napoleon also gave the crown of the Grand Duchy of Warsaw to the new Saxon king in 1807. In the Battle of Leipzig (1813), King Frederick Augustus I was captured, but at the Congress of Vienna (1815), Prince von Metternich saved the existence of the kingdom of Saxony, which Prussia wanted to annex. Saxony was compelled, however, to cede to Prussia about one third of her territories, among them the region of Wittenberg which in the 15th century had given her the name Saxony. (See SAXONY, province of Prussia.)

Saxony became in 1815 a member of the German Confederation and joined in 1833 the Prussian Customs Union (Zollverein). In 1831 the country received a constitution. During the German revolution of 1848–1849 the liberal and democratic movements showed great strength but were defeated. Count Otto von Bismarck's policy was opposed by the Saxon government of Count Friedrich von Beust, but Saxony was beaten by the Prussian Army on the battlefields of Bohemia in 1866. Bismarck accepted Saxony as a member of the North German Confederation of 1867 and of the German Empire of 1871.

The collapse of the empire and the revolution of November 1918 forced the abdication of the last king, Frederick August III, and Saxony became a state within the Weimar Republic. When Hitler abolished all state rights in Germany in 1933, Saxony came under the control of a Nazi governor, Martin Mutschmann. After 1945, Saxony became one of the five states (*Länder*) of the Soviet occupation zone and in 1949 of the German Democratic Republic. In 1952 the Communists abolished the states.

Saxony from 1815–1952 covered an area of 9,366 square miles which made it the fifth largest state within the German Empire. It was formed like a rectangular triangle. Its southern frontier toward Bohemia ran along the ridges of the Erzgebirge, the Elbsandsteingebirge, and Lusatian Mountains. Most of Saxony is mountainous and hilly; only the northern sections around Leipzig and Meissen are part of the North German plain. Since the late Middle Ages it has been the most densely populated area in Germany and remains so today, except for the smaller Ruhr district in western Germany. In the German Empire, Saxony was the third largest state in population (1871: 2,556,000; 1933: 5,200,000).

Saxony's modern industrialization in the sec-

ond half of the 19th century made it the most industrialized state of Germany. Its industries were, however, chiefly manufacturing. There is some hard coal in the Zwickau region, as well as small iron mining. More important is brown coal (lignite) mining, chiefly around Leipzig. The overwhelming group of Saxon industries comprise textile, machine, metalware, electrical equipment, optical and glass, clock, paper, and furniture manufactures. To these may be added some specialized branches such as the world-famous porcelain works of Meissen and the printing trade of Leipzig, the greatest center of German book production in the 18th and 19th centuries. Leipzig was not only the largest industrial city of Saxony but also one of the greatest commercial centers on the Continent.

Other important cities are Dresden, Chemnitz, Meerane, Plauen, Reichenbach, Zwickau, Zittau, Freiberg, and Kamenz. In 1946 the Russians began to mine uranium in the Erzgebirge. The enterprise is directed by the Soviet-owned Wismut Aktien Gesellschaft with headquarters near Chemnitz. The corporation was supposed to have employed in 1951 as many as 225,000 workers, most of them forced labor.

HAJO HOLBORN.

SAXONY, province, Prussia, Germany. Under the terms of the Vienna peace settlement of 1815, the king of Saxony ceded a third of his lands to Prussia (see SAXONY, German electorate and kingdom). Most of them, including Wittenberg and the region along the middle Elbe, as well as northern Thuringia were brought together with former Prussian territories between the Elbe and Harz Mountains and formed after 1816 the Prussian Province of Saxony. Magdeburg became the capital of the new province, which consisted of three governmental districts (Magdeburg, Merseburg, and Erfurt) and 52 counties, covering altogether an area of 15,955 square miles. The population of the province passed the two million mark by 1871 and reached 3,400,592 in 1933 (3 million Protestants, 251,000 Roman Catholics). The province contained in the north some of the best agricultural areas of Germany on which was also based an important sugar industry. Around the Harz, remnants of the medieval mining of copper, lead, silver, and sulphur survived. The most important resources were the large lignite deposits and salt mines around Halle and Bitterfeld. They favored the development of large chemical industries. By 1933 one fifth of Germany's big chemical production was located in the Prussian Province of Saxony. In the war economy of the Nazis many of the factories of synthetic materials were erected in the province. The great lignite deposits served as the chief source of electric power. In 1945 the Province of Saxony became part of the Soviet occupation zone. By adding the small state of Anhalt, the Russians formed, in 1945, the state of Saxony-Anhalt (q.v.). In July 1952 all states in the Soviet zone were abolished and replaced by smaller administrative units.

HAJO HOLBORN.

SAXONY, Orders and Decorations of. See ORDERS AND DECORATIONS—*Germany.*

SAXONY-ANHALT, ăn'hält, former state, Germany, organized by the Soviet military government in 1946 as one of the five states (Saxony-Anhalt, Saxony, Thuringia, Brandenburg, Mecklenburg) within the Soviet occupation zone; area 9,525 square miles. It was composed of the small former State of Anhalt and most of the Prussian Province of Saxony, which was formed in 1815 by joining the territories then ceded by Saxony to the Altmark and Magdeburg. Halle became the capital of Saxony-Anhalt. In 1952 all five states within the German Democratic Republic were abolished and superseded by 14 governmental districts.

SAXOPHONE, săk'sō-fōn, the name of a group of musical instruments invented by Antoine Joseph Sax, better known as Adolphe Sax. They consist of a conical brass tube, sounded by a mouthpiece furnished with a single reed similar to that of the clarinet. They have 18 to 21 noteholes of graduated size controlled by keys for the first three fingers of the right hand, and are all fingered alike.

SAXTON, Joseph, American inventor: b. Huntingdon, Pa., March 22, 1799; d. Washington, D.C., Oct. 26, 1873. After a two-year apprenticeship to a watchmaker he went in 1817 to Philadelphia where he worked at his trade 11 years, studying engraving and mechanics on the side. He constructed an astronomical clock with an original form of escapement and pendulum, and also made the clock for the Independence Hall belfry. Going to England in 1828, he built scientific novelties for the Adelaide Gallery of Practical Science in London. Michael Faraday was among the great scientists with whom he became acquainted. In 1833 he built and exhibited a magneto-electric machine, but due to his failure to publish a description at the time credit for it went to another. During a nine-year stay in England he acquired several British patents. Returning to Philadelphia in 1837 he built the standard weighing apparatus for the U.S. Mint there and became its curator. In 1843 he joined the U.S. Coast Survey in Washington, D.C., as superintendent of weights and measures, an office held until his death. He was a member of the American Philosophical Society and one of the 50 original members of the National Academy of Sciences. The Franklin Institute awarded him the John Scott medal for his reflecting pyrometer invention.

SAY, sā, **Jean Baptiste,** French economist: b. Lyon, France, Jan. 5, 1767; d. Paris, Nov. 16, 1832. His early life was spent in England where he began a commercial career. The French Revolution called him to Paris, and his acquaintance with and interest in the social philosophy and political economy of his time to the staff of the famous *Courrier de Provence,* the journal of Mirabeau. He was afterward secretary to Étienne Clavière, minister of finance. At the close of the revolution he conducted *La Décade,* a journal in which he presented with great clearness and ability the economic principles of Adam Smith, and such subjects as the public credit, the currency, and taxation. He wrote *Traité d'Économie politique* (1803); *Lettres à Malthus* (1820); and *Cours complet d'Économie politique Pratique* (1828–1830).

SAY, Thomas, American entomologist: b. Philadelphia, Pa., July 27, 1787; d. New Harmony, Ind., Oct. 10, 1834. He was one of the

earliest entomologists and is said to have discovered more species of insects than any naturalist before him. His contributions to natural science were contained in his reports upon his expedition to the coast of Georgia and Florida in 1818, and that as chief geologist to the United States Survey of the Rocky Mountain region under Maj. Stephen Harriman Long in 1819–1820, and have been collected by later naturalists. He was one of the founders of the Academy of Natural Sciences in Philadelphia in 1812. In 1825 he joined Robert Owen in his utopian colony at New Harmony. He is called by many the father of descriptive entomology. He was author of *American Entomology: or Descriptions of the Insects of North America,* 3 vols. (1824–1828).

SAYBROOK (now **DEEP RIVER**), town, Connecticut, in Middlesex County, altitude 5 feet; at the mouth of the Connecticut River; on the New York, New Haven and Hartford Railroad; by rail, 33 miles east of New Haven. Fourth oldest town in Connecticut, it was settled by the English in 1635 on the site of present Old Saybrook. For a long time the Dutch and English vied for possession of it. Indian raids almost destroyed it. In 1701 the Collegiate School was founded, from which Yale University was to evolve. In 1708 the Saybrook Platform of church government was prepared for submission to the legislature. Saybrook is rich in relics of its past: old houses and taverns, tablets identifying the scenes of important events, an ancient cemetery, and the statue of Captain Lion Gardiner (q.v.). The town's name was changed from Saybrook to Deep River in 1947. It includes the village of Deep River. Pop. (1940) 2,332; (1950) 2,570.

SAYBROOK PLATFORM, a declaration of principles adopted in 1708 by the Congregational Church synod at Saybrook; substantially the same as the Cambridge platform (q.v.).

SAYCE, sās, **Archibald Henry,** English Assyriologist: b. Shirehampton, Sept. 25, 1845; d. Feb. 4, 1933. He received his education at Queen's College, Oxford, where he was graduated in 1868. He was elected a fellow in the following year, and became a tutor in 1870. In 1876 he was appointed deputy professor of comparative philology at Oxford, and after 1891 occupied the chair of Assyriology in the same university. He was a member of the Old Testament Revision Company. He was an honorary member of the Asiatic Society of Bengal, the Royal Academy of Spain and the Anthropological Society of Washington.

His larger and more important works are *Assyrian Grammar for Comparative Purposes* (1872); *Principles of Comparative Philology* (1874–1875); *The Astronomy and Astrology of the Babylonians* (1874); *Lectures upon the Assyrian Language and Syllabary* (1877); *Introduction to the Science of Language* (1880); *The Vannic Inscription Deciphered and Translated* (1882); *The Ancient Empires of the East* (1884); *The Origin and Growth of Religion as illustrated by the Religion of the Ancient Babylonians* (1887); *Life and Times of Isaiah* (1889); *The Higher Criticism and the Verdict of the Monuments* (1894); *The Early History of the Hebrews* (1897); *Babylonians and Assyrians* (1900); and *Assuan Papyri* (1906).

He was also author of the popular works: *The Monuments of the Hittites* (1881); *Assyria: its Princes, Priests and People* (1882); *The Hittites* (1889); *The Races of the Old Testament* (1891); *Social Life among the Assyrians* (1900); *Reminiscences* (1923); *The Egypt of the Hebrews and Herodotus* (1895); *Murray's Handbook of Egypt* (1896); and *Israel and the Surrounding Nations* (1898).

SAYRE, Francis Bowes, American public official and diplomat: b. South Bethlehem, Pa., April 30, 1885. He graduated at Williams College in 1909 and at Harvard Law School in 1912. In 1912–1913 he was deputy assistant district attorney of New York County, New York, and between 1914–1917 he was assistant to the president of Williams College. He was a teaching fellow of law at Harvard in 1917–1918 and rose to a professorship in 1924, holding the post from 1924–1934, with leave of absence in 1923–1925 to be adviser to the Siamese government for which he negotiated treaties with nine European governments. He was state commissioner of correction in Massachusetts in 1933 when President Roosevelt appointed him assistant secretary of state in which post he negotiated trade agreements with many countries. From 1939 to 1942 he was high commissioner to the Philippines; he escaped from Corregidor by submarine in February 1942. He was special assistant to the secretary of state, and department director of Foreign Relief and Rehabilitation Operations in 1943, diplomatic adviser to the United Nations Relief and Rehabilitation Administration, 1944–1947; United States Representative in the Trusteeship Council of United Nations with rank of ambassador, 1947–1948; member of United Nations General Assembly, 1947–1948. He married in 1913 Miss Jessie Woodrow Wilson, daughter of President Wilson, in the White House. She died in 1933 and in 1937 he married Mrs. Elizabeth Evans Graves of Washington.

SAYRE, Lewis Albert, American surgeon: b. Battle Hill (now Madison), N. J., Feb. 29, 1820; d. New York, Sept. 21, 1900. He was graduated from Transylvania University in 1839, and three years later from the College of Physicians and Surgeons in New York. He was made professor of orthopedic surgery in the medical college of Bellevue Hospital in 1861, and professor emeritus at its consolidation with the New York University in 1898. In 1854 he successfully performed the first operation in the United States for the removal of the head of the femur in hip-joint disease, and became known as the greatest American orthopedist. His original methods and his invention of instruments used in the treatment of deformed children made his name familiar to the entire medical world.

SAYRE, Stephen, American banker and patriot: b. Long Island, June 12, 1736; d. Virginia, Sept. 27, 1818. He was graduated from the College of New Jersey (Princeton) in 1757, became a merchant and banker in London, attained there considerable influence in political circles, but was committed to the Tower on an unwarranted charge of treason. The affair soon ended in his release; but his banking business failed as a result and he was compelled to withdraw from England. Subsequently he was private secretary to Franklin, went with Arthur Lee's embassy to Berlin and at Copenhagen, Stockholm and St. Petersburg was successful in obtaining supplies

for the furtherance of the cause of independence. He was an opponent of Washington's administration in 1795.

SAYRE, sâr, city, Oklahoma, Beckham County seat, 16 miles west-southwest of Elk City. It is served by the Chicago, Rock Island, and Pacific Railroad and modern highways.

The surrounding area is agricultural, broomcorn, cotton, dairy products, and livestock being the principal commodities. Manufactures include carbon black and gasoline. The city is the market center for the large quantities of broomcorn raised in the area. Sayre Junior College (coeducational) is here. The site was settled in 1901, incorporated as a town in 1903, and as a city in 1910. Pop. (1950) 3,362.

SAYRE, borough, Pennsylvania, in Bradford County, altitude 772 feet; on the north branch of the Susquehanna River and on the Lehigh Valley Railroad; by rail, 95 miles northwest of Wilkes-Barre. Sayre is a railroad town; in 1871 Lehigh Valley Railroad shops gave the place its first industrial impetus, and the shops still are one of the principal sources of employment. Coal and lumber interests are strong, and there are silk mills, knitting mills, and a wheel division of the American Brake Shoe and Foundry Company. The borough has public and parochial schools, a public library, a hospital, and churches of various denominations. It was named in honor of Robert H. Sayre of the Lehigh Valley Railroad. Pop. (1950) 7,735.

SAZONOV, Sergei Dmitrievich, Russian statesman: b. 1866; d. Nice, France, Dec. 25, 1927. Entering the diplomatic service, he was second secretary at the Russian embassy in London from 1890 to 1894 and councillor of embassy 1904–1906. His skilful handling of the difficulties arising from the Dogger Bank incident in 1904 marked him for promotion. From London he went to Rome in 1894 as secretary to the newly-created mission to the Holy See, and in 1906 he returned to Rome as minister to the Vatican. In 1909 he was recalled to Russia to assist M. Isvolsky, then foreign minister, whom he succeeded in 1910. A year later he exchanged views in Paris with the French government, and in 1912 visited the king of England. In the diplomatic crisis preceding World War I, M. Sazonov appeared to be the only allied statesman who saw the one method of averting the impending conflict. In the words of Mr. G. Bernard Shaw, "One man among them keeps his head and looks the facts in the face. That man is Sazonoff, the Russian Secretary for Foreign Affairs" (*Current History,* vol. 1, p. 19). In a telegram from Saint Petersburg dated July 25, 1914 the British ambassador, Sir George Buchanan, informed Sir Edward Grey of an interview with Sazonoff, in the course of which the latter said that "he did not believe Germany really wanted war, but her attitude was decided by ours" [the British attitude]. "If we [Great Britain] took our stand firmly with France and Russia there would be no war. If we failed them now, rivers of blood would flow, and we would in the end be dragged into war. . . . His Excellency said that unfortunately Germany was convinced that she could count upon our neutrality" (*British Blue Book,* dispatch No. 17). M. Sazonov resigned his office in July 1916, and in January 1917 was appointed ambassador to Great Britain, but soon retired. His reminiscences were published in 1927.

SBARETTI, Donatus, Italian R. C. prelate: b. Montefranco, Italy, Nov. 12, 1856; d. Vatican City, April 1, 1939. He was educated at the College of St. Apollinaris, Rome, and was ordained in 1879. For eight years after his ordination he occupied the chair of speculative and moral philosophy in the College of the Propaganda, Rome, and subsequently served as subsecretary of the Propaganda in affairs concerning the United States. He was made private chamberlain to Leo XIII, with title of monsignore, and in 1893–1900 was the first to occupy the office of auditor of the apostolic legation at Washington. He was consecrated bishop of Havana in 1900, appointed apostolic delegate to the Philippines in 1901, titular archbishop of Ephesus later in that year; in 1902 apostolic delegate to Canada, serving to 1914. He was made cardinal in 1916.

SCAB, or **SCABIES,** a skin disease in sheep, analogous to the itch in the human subject and to mange in horses and dogs. It is caused by a parasitic mite, *Sarcoptes scabiei.* See also ITCH.

SCABBARD FISH, the name of certain pelagic fishes, allied to the mackerels, and so called because of their compressed and elongated shape. One is *Lepidopus caudatus,* rare in American waters, but known in the eastern Atlantic, Indian and South Pacific oceans. It is the frostfish of New Zealand, where it comes ashore in the surf on moonlit winter nights, and is caught on the beach by men watching for it. It is a favorite food-fish and reaches a length of five or six feet, but weighs only about six pounds.

Another is the cutlass fish, silver fish or hair tail (*Trichiurus lepturus*), which attains a length of three feet or more, and whose tail ends in a filiform point without a caudal fin. It is found on the American coast from New England to South America, and is silvery, with a golden lateral line and grayish-yellow dorsal; the lower jaw is the longer, with two teeth projecting beyond the upper when the mouth is closed, and the whole armature of the jaws indicates carnivorous habits. It is rarely seen except when found benumbed with cold floating on the surface.

SCAD, a name given to several species of fishes of the family Carangidae; in the United States to *Decapterus punctatus,* a fish about a foot long found along most of our Atlantic coast and abundant southward, where it is a foodfish of some importance.

In England the name belongs to the fish also called horse-mackerel (*Trachurus trachurus*) which appears in large shoals and is dusky olive on the back, the sides variegated by bluish bands. It is also known as saurel, cigar fish, and round robin.

A related species (*Trachurops crumenopthalmus*), common in the West Indies, and known on most tropical coasts, is called big-eyed scad.

SCAEVOLA, sē'vō-lä, **Gaius Mucius,** Roman hero and founder of the plebeian family of Mucii: lived about 500 years B.C. Livy tells how Gaius Mucius, a young patrician, sought to kill Porsena of Clusium, the protector of the expelled Tarquins, who was besieging Rome and had reduced the city to great dis-

tress. Mucius went to the tent of Porsenna to kill him, but mistaking his secretary for the chief plunged his sword into him. Porsenna, in rage, had Mucius brought before him, whereupon the young Roman expressed regret at not having killed Porsenna himself, and told him that other attempts would be made and would be successful. Upon Porsenna threatening to have Mucius burned alive if he did not betray the conspirators, Mucius thrust his right hand into a flame and held it there. Porsenna, in admiration for this fearlessness, ordered the young Roman freed, and the latter in return for his courtesy told Porsenna that 300 Roman youths had sworn to assassinate him or die in the attempt. This so alarmed Porsenna that he raised the siege and withdrew from Rome. Scævola, meaning "the left-handed," was the name bestowed upon Mucius in honor of his deed. Quintus Mucius, called "the augur," a Roman tribune, prætor and consul, d. about 100 B.C., and Quintus Mucius, called "the pontifex," Roman tribune, consul and pontifex maximus, d. 8 B.C., are descended from Caius Mucius Scævola.

SCAFELL, ska-fĕl', or **SCAW FELL,** England, a mountain in the county of Cumberland, bordering on Westmoreland, 13 miles southwest of Keswick. It rises from the centre of the lake region, its two peaks reaching an elevation respectively, of 3,229 and 3,092 feet, making the mountain one of the conspicuous features of the scenery. It consists of granite with a superformation of slate, excepting the summit which is composed of trap porphyry.

SCAGLIOLA, skăl-yō'la, an Italian term for an imitation marble used in columns, walls and floors for surface decoration. It was invented by Guido del Conte in Modena in the early part of the 17th century. It is composed of plaster and glue mixed with splinters (scagliole) of spar, marble, granite, concrete, gypsum, veins of clay, etc., artificially colored and smoothed down and polished to a semblance of the quality of polished marble.

SCAIFE, Walter Bell, American author: b. Pittsburgh, Pa., 10 Sept. 1858. He was graduated at the University of Michigan in 1880 and subsequently studied at Johns Hopkins and at the University of Vienna. Since 1889 he has lectured at Baltimore, Pittsburgh, Washington and Boston on history and other subjects. He published 'American Geographical History, 1492–1892,' 'Florentine Life During the Renaissance,' 'A Dissertation on Law and History,' 'A History of Geographical Latitude' (1889); 'The Boundary Dispute between Maryland and Pennsylvania' (1885); 'The Public Schools of Geneva' (1895); 'Legislative Elections in France' (1898); 'A Century's Labor Legislation in France' (1899); 'Organized Labor in France' (1900); 'Work and Wages in France' (1900); 'Labor Conditions in Switzerland' (1901); 'Auto-Dominis' (in Italian, 1914); 'From Energy to Wisdom' (1917).

SCALA, La, lä skä'lä, Milan, Italy, a historic theatre and opera-house opened in 1778, with accommodation for 3,600 auditors.

SCALD-HEAD, an affection of the scalp, as ringworm of the head, etc., the term being vulgarly applied to various disorders similar in nature. See RINGWORM.

SCALE, from Lat. *scala,* ladder or staircase, *in music,* the tone ladder marking the regular succession of intervals in any given key, from the keynote to the octave, and indicating the relative pitch of tones. See MUSICAL ELEMENTS AND TERMS; MODE.

SCALE INSECTS, certain species of the family *Coccidæ* (see COCCUS). Some species of this family popularly called mealy bugs more often than scales, are readily distinguished by being free-moving, whereas the scales proper are stationary except for a few hours after birth or hatching. The males of the family are remarkable in having a complete metamorphosis (other *Hemiptera* have incomplete, and so do the females of this family), one pair of wings, a pair of hooks replacing the rear wings, and an extra pair of eyes in the adult, instead of mouthparts. The female has six legs when newly hatched, but after molting the legs are wanting and the insects are grub-like, stationary, wingless, and are concealed beneath a powdery, cottony or waxy secretion and the cast-off skins. On account of their appearance some of the species are called gall insects, a name more correctly applied to species of the family *Cynipidæ* and *Gallicolæ,* which produce nut-galls or galls.

The family embraces several species which have been useful to man for many centuries and also some that are troublesome upon cultivated plants. The scarlet grains of Poland are scale insects (*Coccus polonicus*) found on the roots of knawel and were formerly an important article of commerce, being used in dyeing various fabrics. Another species found on the roots of burnet has long been used by the Moors for dyeing wool and silk various tints of pink. Kermes or scarlet grain is the dried body of *Lecanium ilicis* which lives on the young shoots of the kermes oak (*Quercus coccifera*), a low evergreen shrub common from Spain eastward to India. In parts of this region this insect furnished a source of revenue to the people. The females grow about as large as peas and before the eggs are hatched, during May, they are gathered, dropped into vinegar, dried in the sun or in ovens, and sold. They have been used for ages to dye cloth a dark brownish-red, but except locally they are almost entirely superseded by cochineal. See COCCUS.

Cochineal is a species (*Coccus cacti*) of the mealy bug group. It is a native of Mexico where it feeds upon certain species of cactus, especially the nopal (*Opuntia cochinellifera*), a kind of prickly pear (q.v.). It is also found in many regions where this plant has been introduced, notably in the Canaries, Java and the Mediterranean region, in some parts of which it has been cultivated. In Mexico pieces of the cactus covered with the insects are cut out at the close of the dry season and protected until the end of the wet season, when they are used for re-stocking the plantation in October. The females lay about 1,000 eggs, about 99 per cent of which produce females. In December the first crop is gathered and other harvests are made until May when the rainy season begins. The females are brushed off the water, or on hot irons, and dried. They usu-

ally lose more than half their weight in the process. A days' work is represented by about two ounces of dried insects — that is, more than 8,000! These insects have been used for dyeing scarlet and crimson, for which purposes they are unequaled, though coal tar products, being cheaper, more readily procured, and in greater variety, have largely replaced them. They are used also for manufacturing pigments such as lake and carmine (q.v.) and for coloring confectionery. See COCHINEAL.

Several other species have been used for dyeing, some being employed by the ancient Egyptians, Jews and Persians for giving the brilliancy or delicacy of tint to certain fabrics formerly highly valued by these nations and the peoples embraced in their commerce.

Other members of the family are noted for their wax, which is used in some countries for candles, varnishes, sealing wax, lacquer and many other purposes. The wax insect of China (*Coccus sinensis*) is a small white species which lives upon sumac and other trees upon the branches of which it deposits its secretion. This resembles hoar frost during June, but becomes somewhat darker and more continuous by August when it is scraped off and melted in boiling water. After straining and cooling it is ready for use. The French have introduced this species into Algeria. In South America another species is locally but not commercially, important as a source of wax and in other countries are several species that might become similarly useful. But the principal species are the lac or shell-lac insects of Asia. See LAC.

Among the species considered troublesome upon cultivated plants perhaps the cottony cushion scale (*Icerya purchasi*) is perhaps the most noted in the United States. This is an Australian insect which was accidentally introduced into California where, being free from the conditions that held it under control in its native habitat it spread rapidly upon orange, lemon and other citrus trees to the dismay of orchardists. It was found that certain species of ladybird beetles (q.v.) play important rôles in checking the spread of this scale in Australia; so, some were imported in the hope that they would eradicate the scale in California. They did. The scale is now practically extinct in California and the lady-bird beetles, being deprived of their food supply, have followed it, since they seem to be unable to adapt themselves to other foods. This is one of the most remarkable instances of man's intervention to bring natural controls to his aid instead of resorting to artificial methods which are frequently cumbersome or unsatisfactory.

The armored scales of the sub-family *Diaspinæ* are generally of small size, but being exceedingly prolific and voracious are of ill-repute. They are generally flattened or slightly convex, covered with a parchment-like membrane, and are of many shapes. The larvæ are either hatched from eggs or are born. They crawl to a suitable place to feed, usually before they are a day old, and become fixed. They are tiny, flat, six-legged larvæ with a pair of feelers and with long sucking beaks. Soon waxy threads appear, coalesce and cover the creatures. After molting the larvæ are legless. After the second molt the males can be readily recognized, being a pupa with wings, legs and antennæ visible; the females become still more grub-like. The male soon emerges, flies a short time, pairs and dies. In some cases the females hibernate, in others they lay eggs, in others bear young, sometimes there may be several generations in a season. Some of the best-known species are the oyster-shell scale, especially *Mytilaspis pomorum*, which is well known upon apple, lilac, willow and other trees. They are named from the shape of the scale, which resembles the shell of some kinds of oysters. This species winters in the egg, the young appear in May, and in the North there is only one brood; two in the South where the insects are believed to hibernate. A very similar species lives upon citrus fruits, and specimens may often be found upon oranges and lemons, especially those that come from the Mediterranean region. The San José scale (*Aspidiotus perniciosus*) is viviparous and enormously productive. It lives upon the woody members of the order *Rosaceæ*, for example, apple, cherry, rose and pear, and upon currants, gooseberries, elm, chestnut, oak, walnut and many other trees and shrubs. The scurfy scale (*Chionaspis furfurus*) is an oval scale with the cast skin at the small end and is frequently found upon apple and pear trees. The red scale of the orange is a close relative of the San José scale and is well known in California, Florida, etc. See ORANGE.

The cottony maple scale (*Pulvinaria innumerabilis*) is often found on Virginia creeper, grapevines, and some other plants, as well as on maples. It is a soft scale which is usually rather conspicuous in spring from its cottony appearance upon the young growths. The "cotton" is really a gum since it can be drawn out into cobweb-like threads. The black scale (*Lecanium oleæ*) is another soft scale which is well known to California olive and orange growers.

Several species of scale insects are found in greenhouses and nurseries devoted to ornamental plants. But they present no more remarkable features in life-history or habits than the preceding, and being of somewhat smaller importance need not be discussed specifically.

Where the natural controls seem to be inadequate to cope with the species various artificial methods have been tested to determine their efficacy. But in many instances these are so cumbersome, expensive, dangerous either to plant or operator, and difficult to apply intelligently, that they have been discarded. Spraying and fumigation are the principal ones in vogue. But it seems highly probable that in many instances the natural controls would hold the scales in check. Man has, however, not yet discovered these controls except in a few cases and in most of these has not made use of them more than experimentally.

Consult numerous bulletins of the agricultural experiment stations and the United States Department of Agriculture; also references under INSECTICIDE.

M. G. KAINS.

SCALE-TAIL, an African flying squirrel of the family *Anomaluridæ*, distinguished from the true squirrels by dentition and various other peculiarities, and especially by the possession of a series of strong keeled scales at the root of the tail, which seem to serve as an aid

in climbing. There are several genera and species, of which the best known is *Anomalurus pedi* of the Gold Coast, which is black and white, and is regarded as a delicacy by the natives. The food and habits are similar to those of the northern flying-squirrels

SCALES. See BALANCE.

SCALIGER, skăl'ĭ-jẽr, **Joseph Justus,** French scholar and author: b. Agen, France, 4 Aug. 1540; d. Leyden, France, 21 Jan. 1609. He was the 10th son of his learned father, Julius Cæsar Scaliger (q.v.), and received from him a fine classical education, as well as a boastful and arrogant nature. He studied Latin at Bordeaux, and Greek at Paris. According to Henisius, he shut himself into his room and committed to memory the whole of Homer in 21 days; he memorized the rest of the Greek poets in three months and the entire body of Greek literature in two years. It was his boast that he was equally familiar with 13 languages. In his 22d year he was converted to Protestantism, a fact which probably retarded his advancement in France. From this period until 1578 he traveled extensively making a poor living from his teaching and writings, but refusing the money offered him by admiring patrons. In 1578 he became professor of belles-lettres at Leyden, a position which he held until his death. Joseph Scaliger's most important works are upon chronology. His 'De Emendatione Temporum' (1583) gave the first complete scientific chronology, and for this work, with his 'Thesaurus Temporum' (1609), and on account of his discovery of the Julian Period, he deserves to be called the founder of the science of chronology. He also annotated the principal works of the chief Latin writers.

SCALIGER, Julius Cæsar, Italian classical scholar: b. Riva, Lake Garda, 23 April 1484; d. Agen, France, 21 Oct. 1558. He is generally accepted as the son of Bendetto Bordoni, a miniature painter of Padua, but Scaliger claimed descent from the Scaligeri princes of Verona, as did his son, Joseph Justus Scaliger. The elder Scaliger, according to his own account, was a page of Emperor Maximilian for 17 years, then received a pension, studied at Bologna, commanded a squadron under the French viceroy, studied natural law, and in 1525 accompanied the bishop of Agen to his diocese in France where he settled as physician. In 1530 he married a lady of rank and from that time put forth pretentious claims as to his ancestry. He was a man of unusually great learning, a versatile Latin poet, but bold and arrogant, so that while his writings brought him admirers among the scholars of his day, his personal conduct gained him many enemies. His principal works include commentaries on the work of Hippocrates 'De Insamnis' (1538); of Aristotle, 'De Plantis' and Theophrastus, 'De Causis Plantarum' (1566); an attack on Erasmus, 'Oratio pro Cicerone contra Erasmum' (1531), 'De Causis Linguæ Latinæ' (1540); 'Poetices Libri VII' (1561).

SCALLOP, a well-known bivalve mollusk. The scallops form a family (*Pectinidæ*) related to the oysters, which they resemble in having a single adductor muscle. The genus *Pecten,* which in the wide sense is nearly coextensive with the family, has the following characteristics: The shells are more or less orbicular, with an ear developed on each side of the umbo, making a straight hinge-line, generally ornamented externally with more or less developed radiating ribs. The hinge-teeth are lamellar, but usually small and obscure, the principal ligament is internal and solid, and the muscle-star is single. The mantle margins are open all around, reduplicated and, besides a fringe of tactile filaments, bear numerous conspicuous eyes of a brilliant blue or silvery lustre. These eyes are the most complex known among the *Pelecypoda* and consist of a nervous layer, a choroid coat, lens and cornea and receive an optic nerve from the circumpallial trunk. The gills are delicate and of peculiar structure, the foot small and papilliform and in the young has a byssus gland, and the genital ducts open into the kidneys or near their apertures. Only the posterior adductor muscle is present, and this is large, round, central, and remarkable from its constitution in part of striated and in part of nonstriated fibres. Scallops are remarkable, especially when young, for their activity, and swim in a peculiar jumping fashion by opening and powerfully closing the shell valves as though flying, thus forcing out the contained water and propelling themselves forward. As they become older and the shells heavier they are more quiescent. Fully 200 living and a still greater number of fossil species are known beginning in the Carboniferous strata. Perhaps 40 species occur in North American waters, the great majority southward and in moderately deep water. Several of our own and foreign species are of commercial importance, furnishing the well-known scallops of the markets. *P. jacobæus,* a native of the Mediterranean, is the scallop shell which pilgrims were accustomed to wear in front of their hat in token of having visited the shrine of Saint James at Compostella.

Although the richly colored and beautifully formed shells of the scallops are much used in fancy work of various kinds, these mollusks derive their commercial importance from the use of the muscle for food. Before the advent of the white man they were largely gathered for this purpose by the Indians. The principal fisheries are on the coast of Maine, in Long Island Sound, Buzzard Bay and contiguous waters, and on the coasts of New Jersey and California, the first two having the greatest magnitude. South of Cape Cod *Pecten irradians,* which has the shell marked with about 20 prominent radiating ribs on each side, is the species sought. This lives especially in the shoal waters of the bays or on flats in the Sound. Scallops vary greatly in abundance from year to year and the seat of the fisheries changes accordingly, some formerly favorite grounds being abandoned and others developed. The commercial scallop fishery of Maine originated about 1880 and has since developed into an important industry at many points east of Casco Bay. Here the giant scallop (*P. magellanicus*) is the species sought. This is much larger than *P. irradians,* and the valves are marked with numerous fine radiating lines, the lower valve being nearly flat and white and the upper convex and brown. This species lives in deeper water and like the other changes its feeding ground. Scallops are now taken almost exclusively in small dredges, resembling in most

features the oyster dredge, and pulled over the ground by means of small boats; larger vessels when used serve chiefly for transportation, etc. The fishing season varies; south of Cape Cod it covers the cold months, but about Mount Desert the bulk of the catch is made during July and August.

Consult Ingersoll, 'The Fisheries Industries of the United States,' Sec. V (Washington 1887); Smith, 'The Giant Scallop Fishery of Maine'; Bulletin United States Fish Commission 1889 (1891); Stearns, *Overland Monthly* (1873); Zittel and Eastman, 'Textbook of Palæontology' (Vol. I, London 1900); Risser, 'Thirty-first Report of the Commissioner of Rhode Island Fisheries' (Providence 1901).

SCALP, the outer covering or integument of the upper part of the skull or brain-case. Except in the fact that hair in both sexes grows more luxuriantly on the scalp than elsewhere the skin of the scalp differs but slightly from ordinary skin. But besides its constituent of skin, the scalp is composed of the expanded tendon of the occipito-frontalis muscle, and of intermediate cellular tissue and blood-vessels. Injuries of the scalp, however slight, must be carefully watched, for they may be followed by erysipelas, inflammation, suppuration or pyæmia that may easily prove fatal. Prompt antiseptic dressing lessens the danger in such accidents. In the treatment of scalp-wounds no part of the scalp should be cut or torn away; and, if possible, stitches should be avoided, as plasters and bandages will generally keep the separated parts in apposition. Burns of the scalp are very liable to be followed by erysipelas and diffuse inflammation, but the brain is comparatively seldom affected in these cases. Tumors of the scalp are not uncommon, the most frequent being the cutaneous cysts popularly known as wens, and vascular tumors. Parasitic diseases also affect the scalp, and require special treatment. Catarrhal inflammation of the hair-follicle and other hair-destroying diseases result from micro-organisms. See DANDRUFF; PITYRIASIS; RINGWORM.

SCALPER, a common term in the United States applied to any person who buys railroad, theatre or steamship tickets at a discount from people unable to use them, and sells them again at an advance on the price he paid for them. Theatres and transportation companies have devised various plans to break up this trade, and in some States laws have been passed forbidding the sale of railroad tickets at cut-rate prices.

SCALPING, the act of partly cutting and partly tearing off the skin of the head, with the hair attached, of a living or a dead victim. Scalping was practised in early times, by most of the savage and barbarous nations of the eastern hemisphere, as the Scythians, Gauls and other wild peoples of Asia and Europe, and later by the American Indians residing principally in the eastern United States and the lower Saint Lawrence region. It seems to have been unknown until comparatively recent times, in the great plains regions; and it was little practised among the Pueblo and other more cultured tribes of the United States. It was unknown south of the Rio Grande except where introduced by American tribes; and was absent from Central and South America. Nor was scalping practised in the Canadian Northwest or along the whole Pacific Coast. Sometimes the entire head was taken in lieu of the scalp. After the scalp was taken, it was tanned and then stretched on a small hoop of wood, and the side opposite to that having the hair was painted in various colors, and even the hair was tinted likewise. Sometimes the portrait or the hieroglyphic device of the person scalped was placed on it. Persons scalped did not always die from the effect. Scalps were regarded as trophies of victory and prowess. Joutel relates that in 1687 among the Cenis of Texas, a scalp was waved or offered in ceremony to the four quarters of the world, and that tobacco and hominy were offered to the scalps that were paraded. In 1703, Bienville offered 10 «escus» (*écus*, about 10 crowns) for every scalp of a man killed or prisoner taken of the Chetimachas and Alibamons (Alibamas). The American colonies offered bounties for scalps. In 1724 Massachusetts offered 100 pounds sterling (about $500) for Indian scalps; 30 years later, during the so-called French and Indian war, the French offered a bounty for British scalps, and the colonists for Indian scalps. In 1755, 40 pounds sterling (about $200) was offered by Massachusetts for the scalps of male Indians over 12 years of age, and 20 pounds sterling (about $100) for the scalps of women and children.

This official encouragement to scalping led to the extension of the practice to tribes that had never before indulged in it. Naturally among these latter tribes the scalp had little or no ceremonial significance as it seems to have had among eastern tribes. Scalping appears to have probably arisen out of head-hunting which seems to have been common in parts of America at an early date. Among the tribes originally addicted to scalp-taking, a scalp dance formed a part of the ceremonies held on the return of a war party. In this dance the women, not the men, carried the scalps. The scalp was not, as popularly supposed, a standard by which to judge the powers of the warrior.

Consult Braunschweig, 'Scalping' (Smithsonian Reports 1906–07); Friederici, 'Skalpieren und ähnliche Kriegsgebräuche in Amerika' (1906); Handbook of American Indians, 'Scalping' (Washington 1910).

SCALY ANT-EATER. See MANTIS.

SCAMANDER, skạ-măn'dẻr (ancient XANTHUS), Turkey in Asia, a small stream in the Troad, rising near the city of Ilion. It had two sources, one of which was hot, the other cold. Strabo asserts, however, that it had but one source, which was in Mount Ida. Its direction was west-northwest, and about two miles from its mouth it received the small river Simois; it emptied into the Hellespont. Since the beginning of the present era these rivers have had separate courses. The Scamander is sometimes identified with the Mendere or Meander (q.v.).

SCAMMONY, a gum-resin obtained from the *Convolvulus scammonia*, native to the bushy wastes of western Asia. This is a climbing plant with irregularly arrow-shaped leaves, white or purplish flowers like morning-glories, and a fleshy tapering perennial root. When in flower incisions are made obliquely in the upper part of this root, and shells fastened below the gashes, in which the sap is caught as it exudes. They

are then emptied, the juice added to scrapings from the root, thoroughly mixed, dried, and kneaded into cakes. Scammony is much adulterated, but when pure or "virgin" is greenish-gray or blackish in color, internally porous and of a resinous lustre, breaking with an angular fracture and translucent in thin pieces. It has a peculiar, somewhat cheeselike odor and an acrid taste. Different kinds of the drug are named after the districts in which it is collected and the place of export. Scammony is a strong purgative usually used in combination with other medicines, and supposed to have been known to the Greeks as early as the 3d century B.C.; also to have been one of the medicines recommended by Helias to King Alfred the Great.

SCAMOZZI, skä-môt'tsê, **Vincenzo,** Italian architect: b. Vicenza, 1552; d. Venice, 1616. He was taught by his father, also an architect, and by Palladio and Jacopo Sansovino, at Venice; and at Rome he studied ancient monuments. Returning in 1583, he was commissioned to erect a monument to the family of Marc Antonio Barbari, in the church of the Caritá, and so much was this work approved that he was appointed to finish the grand library at Saint Mark's, to build the Trissino Palace at Vicenza and the Cornaro Palace on the Grand Canal, Venice. By this time Scamozzi's fame had spread over Europe and he was in great demand. He built the Ravaschieri Palace at Genoa, and added the second story to the Palazzo Strozzi at Florence (1594). About 1604 he designed the cathedral of Salzburg, Austria, and a part of the Schloss at Prague, Bohemia.

SCAMOZZI IONIC ORDER, in architecture, a type of the Ionic order in which the four faces of the capital are identical in design. It was named for Vincenzo Scamozzi (q.v.) who, however, did not invent it. The spiral volutes on all four faces meet at an angle in the corners, and at the center curve down into the top of the echinus instead of joining in a horizontal band. A rosette usually occupies the space which, in the Ionic order, is filled by the band connecting the volutes. In some instances the centers of the volutes are connected by garlands.

SCANDAL, in law, any injurious statement concerning another person which may constitute the foundation for legal action. In the popular meaning of the term, scandal is the report, whether true or false, of disgraceful behavior on the part of a person of good reputation, or malicious gossip leading to the loss of reputation by the implicated individual. In England under statutes of Edward I and Richard II, *scandalum magnatum,* the defamation of men in high official position, was an offense punishable by the recovery of damages. Although these statutes were long in desuetude, they were not abolished until 1887.

SCANDERBEG or **SKANDERBEG,** skăn'dĕr-bĕg, Albanian chief and national hero: b. about 1403; d. Lesh (Ital. Alessio), Albania, Jan. 17, 1468. He was the fourth son of John Castriota, a high official of Serb origin, and his real name was George Castriota. An uncle, having married into one of the leading Albanian families, commanded the Albanian fortress of Kroja. When the Turks began to occupy Albania and a Turkish governor occupied Kroja as his headquarters, the 11-year-old George was sent to Constantinople as one of the hostages. There he was educated as a Moslem and given the name and title of Iskender (Alexander) Bey, corrupted by his compatriots to Scanderbeg. Under the Turks he made a distinguished record as administrator and soldier, governing a sanjak and fighting in wars with the Serbs and the Venetian Republic. While campaigning against the Hungarian János Hunyadi in 1443, he learned that his native land had revolted. From that moment his chief concern was the liberation of Albania. He entered into a secret agreement with János Hunyadi, pretended to have suffered a serious defeat and retreated to the fortress of Kroja. Once in possession, he declared himself a Christian, rallied the Albanian clans, married the daughter of a local patriot chieftain and, with the assistance of his brother-in-law Stephen Crnojevich, ruler of Montenegro, successfully challenged the Turkish power. Venice subsidized him as an ally against the traditional enemy. He also received the support of the pope and the king of Naples. Mohammed II finally concluded a 10-year armistice with him in 1461, acknowledging the independence of Albania and Epirus. Unfortunately, at the behest of Pope Pius II, who was organizing a crusade against the Turks, Scanderbeg soon broke the truce, and when the pope died in 1464 and the crusade withered in the bud, he found himself abandoned by his Western allies. Mohammed the Great himself laid siege to Kroja in 1466, and Scanderbeg hurried to Rome to entreat the aid of Pope Paul II, but without avail. He returned to Albania and died in the Venetian colony of Alessio in 1468. The Turks then succeeded in reconquering all of Albania except Kroja which Scanderbeg's son Giovanni ceded to Venice.

SCANDINAVIA, a general designation for the three north European kingdoms, Denmark, Norway and Sweden (qq.v.), sometimes applied in a more restricted sense to the two latter only. In the Middle Ages the name of Northmen was bestowed indiscriminately on the inhabitants of the three countries, whose closely related languages and common mode of life and political fortunes afforded sufficient basis for considering them one people. As a geographical term, Scandinavia is rapidly passing out of use, but the appellation is still employed in an ethnographic, and especially in a literary sense.

SCANDINAVIAN LANGUAGE AND LITERATURE. See DANISH LANGUAGE; DANISH LITERATURE; NORWEGIAN LANGUAGE; NORWEGIAN LITERATURE; SWEDISH LANGUAGE; SWEDISH LITERATURE.

SCANDINAVIAN MUSIC. For centuries, any knowledge of the life and culture of the ancient peoples of the Scandinavian countries remained in almost complete darkness. Their weird legends and mythology, their songs and epic poems, and their sagas were known to the Norsemen themselves, who inhabited and still inhabit the North; to the rest of Europe they were unknown. The earliest historical records of these Northern peoples are scant and few. They are to be found in the fragmentary accounts of the voyages (c.330 B.C.) of Pytheas of Massilia (Marseille), and are preserved for us through

the writings of Strabo and Pliny. Toward the beginning of the Christian era, Roman and Greek writers like Julius Caesar, Tacitus, Jordanes, and Procopius mentioned the people of the North. But these records, extending from the time of Pytheas to Procopius, and covering a span of about 900 years, in which the Greek and Roman cultures reached their glory and slow decline, give us very little information about any civilization or culture beyond the nearest neighbors of the Roman Empire. Aristoxenus and others wrote very learnedly of the old Hellenic and Roman music, regarding the content of which we still know very little. Concerning the ancient Norsemen and their music nothing was known. But through this mist comes a gleam from a remote age, the Bronze Age (c.2000–1000 B.C.). A strange and high culture is revealed through the many finds in graves and burial mounds. The rarest of these finds, in an artistic and musical sense, is the mighty bronze horn, the lur. These horns, some over 7½ feet long, are masterpieces of bronze casting and show a craftsmanship which could scarcely be surpassed today. The ancient bronze lur is without doubt the oldest artistic musical instrument so far found in the world. It was cast in molds, in several pieces; these were then joined with interlacing rivets. The shape of the whole tube is conical, gradually expanding from the mouthpiece to the bell, which abruptly bends off to the sides, making a flat front. That the early Norsemen were able, with their crude and scant technical resources, to cast bronze in several gradually expanding, conically shaped, and gracefully bent tubes with comparatively thin walls, where the one piece must fit exactly into the other, can only excite our admiration for the masterful way in which it was done. The lur has, as a rule, been found in pairs tuned to the same pitch, these pitches again varying in the different pairs of horns. The pitches are G, B, C, E flat, and E. The contour of the lur is not straight, but bent somewhat to the shape of an S. Artistically interesting is the fact that each horn is bent or swung opposite to its mate. Thus the horn of the player standing to the right bends from the mouthpiece, back over his right shoulder, then up and forward over his head. The horn of the player to the left bends to the left, and then up. This bending of a pair of horns opposite to each other has no effect on the playing, but merely shows the artistic sense of the old Nordic instrument makers and again bears proof of their remarkable knowledge of bronze casting. The tonal range of the lur is greater than that of any modern metal blow instrument except the French horn. Some well-preserved specimens have a range of 4½ octaves, or from D below low C to G under high C. Many of the horns are in such excellent condition that they can still be blown. They produce a tone both powerful and mellow, not unlike the modern bass trombone, but with a distinct and noble quality entirely their own. They possess all the so-called natural tones, that is, tones produced with the lips only. Good specimens can produce 22 of these tones. They have, of course, no valves. The mouthpiece is remarkable in its similarity to that of a modern trombone, only a little more shallow. It is difficult indeed to calculate how many generations passed before these old masters were able to cast their bronze horns with such consummate skill and artistic beauty, thus proving themselves the possessors of the extraordinary acoustical knowledge which enabled them at will to cast these instruments to their different pitches. When the average extant lur can easily produce 12 tones, and some well-preserved specimens 22 to 23 tones, then we have a right to assume that the old horn blowers were able to play at least 8 of the 12. When then several pairs of the horns are found together, and these in pairs tuned to different pitches, we again have a right to assume that the Nordic Bronze Age people knew a certain primitive harmony; for example, a major triad, and perhaps a minor one. By merely blowing 2 or 4 or 6 of these horns in their different pitches at the same time, both melody and a certain crude harmony could be had, even quite accidentally. The horns unearthed in Norway and Sweden are older than those found in Denmark, where, however, the greater number and best-preserved specimens so far have been found. It is interesting to note that in carvings on stone monuments and in some of the old mythological poems, the lur is mentioned as the Horn of the Gods.

Archeologists generally agree that, as a rule, very few copies are found of antique things compared with what the people actually had. Consequently the lur must have been an instrument common to all the people of the then inhabited parts of Norway, Denmark, and Sweden. These tangible proofs of an old music culture, flourishing some 3,500 years ago, and with so much mechanical and acoustical knowledge, the equal of which in instrument making was only attained by the rest of Europe in medieval times, furnish the historical background of Scandinavian music. With the advance of new cultures and civilizations, the life of the Nordic Bronze Age people slowly changed. The old lur fell into disuse, soon to sleep its age-old sleep in bogs and burial mounds. At the dawn of Christianity, other musical instruments developed, and poetry and singing became more and more the expressive medium of the people's spiritual and emotional life.

Early history and tradition in the North centered around the southern parts of Norway and Sweden, the adjacent Danish islands, and the Cimbrian Peninsula. In the dim past, a common language, mythology, and customs were shared by the three Scandinavian peoples. At the beginning of the Christian era, none of them was as yet a separate nation or realm. From about the beginning of the 8th century, they appear more and more on Europe's historical scene as three distinct nations. Language and customs, however, remained the same for several hundred years. As late as the 11th and 12th centuries, linguistic differences were still very slight, but characteristic changes began to take definite shapes, and slowly there were formed the three dialects which gradually evolved into the Norwegian, Swedish, and Danish languages (qq.v.). But even in our time most people from the three countries can understand one another without difficulty.

During the turbulent years of the Viking age (c.800–1000 A.D.), contact with the other European countries became more firmly established. Most important for Norway and Denmark was the close connection with the people of the British Isles, and to a somewhat less degree, the contact of Sweden and parts of Finland with southeastern Europe. But it was the west European contact

which became the more important. When the Norsemen came to the British Isles, they brought their folk music with them, and here it influenced and was in turn influenced by the native music. Already the Celts and the Norsemen had a music culture developed and apart from the Greek-Roman music, and both in the British Isles and in the Scandinavian countries this culture and tradition was of a great antiquity. Thus it follows that shortly after 1188, the Welsh scholar, Giraldus Cambrensis, wrote that the people of northern England sang in duet, and that the people of Wales sang with as many voices as there were singers—forms of singing they had learned from the Norwegians and Danes who had settled there. (See NORWEGIAN MUSIC.)

The old Norsemen loved poetry, singing, and harp playing. The great episodes from the sagas, especially *Volsunga Saga,* have often been used for artistic treatment by Norwegian craftsmen. Particularly such incidents as Sigurd, q.v. (Siegfried) and the dragon Fafnir, and King Gunnar in the snake pit are depicted in beautiful 900-year-old wood carvings on door jambs of Norwegian churches; of great importance are the carvings which show different forms of the old Nordic harps. In the old *Beowulf* poem, musical instruments are mentioned, such as the hearpe, the gamenwudu, and the gleobeam, which leads attention to the Finnish kantele, often in Finnish folk poesy called the joymaker. The kantele belongs to the psaltery group of instruments. Other instruments used in the North were the fithla (fiddle), and the gigja (gigue), forerunners of the violin; the Icelandic langspil, the Norwegian langeleik or langhørpu, both related to the old monochord; the organistrum, the symphonia (cinfonie, sinfon, fon), flute, bagpipe, drum, cow horn, goat horn and reed flute, the nyckelharpa or keyboard fiddle (see SWEDISH MUSIC). In Denmark, and especially in Sweden, the humle (hommel), a zitherlike instrument, was much in use. Another instrument is the tallharpa, a relic of the old bowed lyre, and played mostly by descendants of Swedish settlers on the Baltic east coast. According to the Finnish musicologist, Otto Andersson (who in 1903 rediscovered the instrument), its name "tall harp" is derived from the fact that originally its 3 to 5 strings were made from horsehair, which in Swedish and Norwegian is called *tagel,* or in the vernacular, *tall.* It is believed the tallharpa also was used in Norway. At the beginning of the 20th century, it was still very popular on the Estonian Islands, where it is often called Swedish harp or Swedish kantele (rootig kantele). The instrument probably originated in Sweden. In Denmark and Sweden the violin did not develop along the line and form that it did in Norway, until there, at the end of the 15th century, it evolved into the hardingfele (see NORWEGIAN MUSIC).

The church was of influence in providing a common religious music for the Scandinavian countries. But certain compositions appeared in one country and not in another, as for example the *Hymn to St. Knud* (Canute IV) in Denmark, or the sequence *Lux Illuxit Laetabunda* which was composed and sung in Norway in honor of the martyr king, Olaf II, or St. Olaf, long before his sanctity was much known outside the country. Or the old mythological poems were chanted to tunes which undoubtedly had their origin in church music. Thus the old poem *Voluspá* was sung to a melody very similar to a Gregorian chant heard every Wednesday, the *Lamentations of Jeremiah.* The folk songs wandering over the North often had the same origin, and like true folk songs, they found a home wherever they were sung by the people, the story, and often the melody, changing a little with the new locality and language. In Norway, Sweden, and Denmark the folk songs eventually acquired their own distinct national character. In Finland the tunes for the cantos (runot) were sung; here outside influence was also very slight. The Nordic folk music had their three distinct phases—rhythm, melody, and harmony—corresponding to the drum, the flute, and the lyre. The rhythm shows that 7/4 and 5/4 time were often used. Most of the older folk songs were originally sung to dancing. This song-dance, to which the epic-lyric folk song was sung, is still danced and sung in its original form in the Faeroe Islands today. It can be traced back to the old French ring dances like the caroles and especially the branles; also they are similar to the old Greek dances as described by Homer in the *Iliad,* and still danced at Megara and Elevsis in Greece. The models for the old Nordic epic-lyric folk songs were the French *chansons d'histoire* and the *chansons de toile.* To make the story-relating Nordic songs suitable for dancing, however, refrains were used, these often being taken from still older verses. From France (Normandy) the song-dance went to England, from there to Norway, and thence to the then Norwegian possessions—Iceland, the Faeroe Islands, and the Shetland Islands. To Denmark and Sweden similar dances came mostly from Germany.

Iceland lost in the short space of 12 years (1402–1414), through the Black Death, about two thirds of its population. This calamity, in an already sparsely settled country, is undoubtedly one reason why so many of the oldest Icelandic folk songs and melodies have been lost. But among those left are found tunes and remnants of scales that speak of high antiquity, and show characteristics different from, and antedating, the church music in the North. Since Iceland had little musical contact with the outer world, these melodies have kept their original form and tonality. The old way of singing in parallel fourths and fifths is still in vogue in the so-called *tvisøngur.* The folk songs include love songs, lullabies, satirical songs, and nature songs. Of a later date are the *vikivaki søngur,* which flourished from the 15th to 18th century. The *vikivaki* songs were as a rule dance-songs, and were sung during the eves preceding the great holy days like Easter and especially Christmas. These meetings or festivities were called *vikivakar;* the origin of the name has not been satisfactorily ascertained. *Vikivaki* songs are often quite complicated in their structure, with remnants of the style found in the old saga poetry, their contents varying from the serious to the humorous and gay. Already in the 11th century the song dances were mentioned in Icelandic writings. The *vikivaki* songs took the place of the older dance-songs. Gradually, as the years went by, the quality of the songs, and the singing and dancing, assumed a more and more improper and crude character, although it never reached the degrading forms it did in Germany. However, it caused the Icelandic clergy to wage such a strong opposition against the continuance of the *vikivaki* meetings

that they finally, by royal decree in 1746, succeeded in completely abolishing them. This was also another reason why so many of the old Icelandic folk songs were forgotten. Most of the old and the newer folk songs have been collected by Dr. Olafur Davidsson (1862–1903). Other collectors are Sveinbjørn Sveinbjørnsson (1847–1927), and Dr. Bjarni Thorsteinsson (1861–1938).

In the Shetland Islands, the Hjaltland of the old Norwegians, the song-dances were kept alive until the middle of the 18th century. The texts of the songs dealt mostly with the kings and heroes of the old Norwegian history, in a language peculiarly half Norwegian and half English. Late in the 18th century the only remaining one of these songs—the ancient *Hildinakvad* (kvad-song or poem)—was written down at the island of Foula.

In the Faeroe Islands instrumental music was practically unknown until the end of the 19th century. Here we find the old song-dances as they were sung and danced a thousand years ago; also the oldest and most complete epic folk songs and melodies in Europe. The Faeroe dance's traditional steps, the same as in the French branles, are still the fundamental accompaniment to the old ballades. The song leader sings the many verses and the rest of the dancers in the ring sing the refrain, the *stev;* or both verse and refrain are sung by all the dancers. While the old ring-dances elsewhere in medieval Europe were danced to lyric verses—love songs—and often accompanied by instrumental music, the majority of the old Faeroe songs were of a story-relating and heroic character, their contents taken from the history of the old Norwegian kings, from the mythology and from the sagas. In the mighty *Sjurtharkvaethi,* the story is about Sigurd Fafnirsbani (Siegfried) and his adventures, and one of its many tunes is perhaps the oldest folk song melody known in Europe. To the islanders, the contents of the dance-songs were their only source of historical information, and then largely old Norwegian history. It was also their introduction to the old Nordic world of myth and saga. The Faeroeic dance-songs are full of dramatic life and emotional power. They have quite a characteristic saying in the islands: "No step without a tone." Most of the texts and melodies have now been written down: the *Sjurtharkvaethi* was recorded by the Dane, Hans Christian Lyngbye (1782–1837), and printed in 1820; and these songs and many others by the Faeroese, Venceslaus Ulricus Hammershaimb (1819–1909), and printed in two volumes, *Faeroeic Songs* (*Faerøske Kvaeder,* 1851–1855).

The contents of the older Norwegian dance-songs and ballades have, quite naturally, much in common with the Faeroeic songs. Motifs from the old Edda poems are used in the songs about Sigurd Svein (Siegfried); or songs were about Charlemagne and the valiant Roland at the Battle of Roncesvalles (778); or the songs could be about trolls and ogres, heroes, and princesses, visionary and religious songs. It is of interest to note that the Nordic lyric dance-songs have merged with the epic songs and served as their introduction or refrain (the *stev*). They create the mood, the background for the song-story. In the North the epic song reached its highest development. Of romantic songs about knights and ladies, the so-called *riddervise,* Denmark and Sweden have the best. In Denmark, the folk songs were written down at a comparatively early date; in Sweden and Finland, somewhat later; and in Norway, at first towards the middle of the 19th century. Outside of the pure folk music in the North, foreign influences are apparent in the art-music. English, French, Dutch, Italian, and German musicians were introduced, and in many instances left their mark on Scandinavian music. Toward the end of the 18th and during the 19th century the newer, national schools were inaugurated. This movement started largely with Edvard Grieg. No one has made a more artistic use of the folk music than he. Grieg and Jean Sibelius are still the two greatest exponents of these new schools. In the mid-20th century, one can no longer speak of Scandinavian music as a whole, but of definite branches thereof—Norwegian, Danish, Swedish, and Finnish music—all having their roots in a common Nordic past with age-old traditions. See also separate articles on the music of the various Scandinavian countries.

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SCANDINAVIAN MYTHOLOGY. The pagan beliefs of Scandinavia have been preserved by Christian writers and are therefore only fragmentarily known. Thanks, however, to the diligence of medieval Icelandic scholars, they are more fully preserved than those of any other Germanic tribe. The chief sources of information are the two Eddas (q.v.): the *Elder,* or *Poetic, Edda,* a collection of some 30 mythological and heroic poems discovered in 1643, and probably composed between the 9th and 13th centuries; and the *Younger,* or *Prose, Edda,* which was written by Snorri Sturluson (1178–1241, q.v.) as a handbook of poetics. Supplementing these two major sources are the poems of the *skalds,* or court poets, who even after the coming of Christianity, used mythological allusions to adorn their verses; a few runic inscriptions, occasional comments by classical writers (especially Tacitus in his *Germania*), the writings of the German historian, Adam of Bremen (d. c.1076), and the Danish historian, Saxo Grammaticus (1150?–?1220), the sagas of Norway and Iceland, Finnish folklore, and the evidence of pagan worship offered by Scandinavian place names. Modern scholarship has revealed that the system of mythology presented in Snorri's *Younger,* or *Poetic, Edda,* on which most accounts of Scandinavian paganism are based, represents only the very last stages of this religion as practiced in Norway and Iceland of the Viking age (c.800–c.1050 A.D.). In the Viking age, it was already strongly influenced by Christianity, and pervaded with literary and poetic fantasy. The truth seems to be that Scandinavian mythology was never a unified body of doctrine, but an aggregate of local practices of worship which varied from age to age and from country to country.

Snorri's Mythology.—The system of the *Younger,* or *Prose, Edda* is a complete cosmogony, covering the entire existence of the world. Creation was thought of as the spontaneous result of a union between heat and cold in a chasm called Ginnungagap. The giant Ymir and the cow Audhumla (qq.v.) thus came into being, and through some further links were descended Odin (q.v.) and his brothers. They created the visible world from the body of Ymir, and made the first human couple, Ask (q.v.) and Embla, from two trees. Conflicts quickly arose between men

and giants (*jotnar*), so that the gods had to protect men by creating in the midst of the universe a fortress called Midgard, (q.v., the earth). In the center of it they had set their own dwelling, Asgard, (q.v., for they were called *Aesir*), and outside the wall lay the home of the giants (Jotunheim, a name adopted in modern Norway to designate the wildest mountain region of the country). In Asgard there were 12 chief gods, each with his own palace, but all under the leadership of Odin (Old High German, Wuotan; Old Saxon, Wodan; Anglo-Saxon, Woden; the name occurs in the English Wednesday), father of the gods and ruler of the world. The greatest shrine of the gods was the ash of Yggdrasill (q.v.), which spread its branches over the entire world, and whose roots extended into Asgard, Jotunheim, and Niflheim (q.v.), the latter being the deepest cavern of darkness. This ash tree with its constant process of growth and destruction is a symbol of the universe and its changing fate.

Odin was married to Frigg (from whom we have Friday), and one of his sons was Thor, (q.v.) (cf. Thursday), the god of thunder and the protector of man against the giants, who are clearly associated with the hostile forces of nature. Balder (q.v.), the god of innocence, was another son of Odin and the husband of Nanna (q.v.); he was slain with a dart of mistletoe by the blind god Hoth (Hodr) at the instigation of Loki, and his death was the great tragic climax in the life of the gods. Tyr (q.v.) (cf. Tuesday), the one-handed, was the god of war, while Njorth and his son Frey (q.v.) were gods of fertility who belonged to an originally hostile and older group of gods called the *Vanir*. Another member of this group was Frey's sister, Freya, the goddess of love and beauty. To make life more interesting, the gods had in their midst the evil and mischievous Loki (q.v.) descended from the giants and himself the parent of certain fearful monsters like the Fenris-wolf, the Midgard serpent, and Hel, the female keeper of the dead. Loki was the central figure of innumerable adventures in which he alternately tricked and helped the gods; in the end he suffered for his crimes by being chained in a way reminiscent of the fate of the Greek god, Prometheus. Thor was also involved in a number of adventures, some of them bordering on the burlesque, while Odin's adventures displayed a more subtle cunning. In addition to Frigg and Freya, there were several other goddesses known as the Asynjur.

Odin was the particular protector of warriors, and he sent his Valkyries, (q.v., "the choosers of the slain") to bring him heroes who had died on the battlefield. In his Valhalla, (q.v., "the hall of the slain") they fight and feast until the day of the final world battle when they go forth as Odin's host. This was the famous Ragnarok, (q.v., "doom of the gods," not "twilight" as Wagner understood it), which will be introduced by three years of world war and three years of icy winter. After a veritable Armageddon between the gods and the giants, all will be destroyed by fire, and a new world will rise out of the sea, and a new age will begin when Balder returns from Hel, and "the mighty one who rules all" descends to create a new, just and happy race of men.

Origin.—Snorri himself interpreted the gods as being heroic men who immigrated from Asia and were elevated to divinity. Early German mythographers thought an original monotheism had degenerated into a disgraceful polytheism. Scholars like Max Müller and Viktor Rydberg made much of the idea that the gods were allegories of nature. All of these views have been abandoned in the light of a renewed examination of the evidence. The foundation of a scientific study was laid by the German mythologist, Jakob Grimm (1785–1863, q.v.), in his *Deutsche Mythologie* (1835), although he made the error of assuming that the mythology of the Eddas was of general Germanic origin. Folklorists like Wilhelm Schwartz and Wilhelm Mannhardt distinguished between the "lower" mythology, or universal belief in nature spirits, and the "higher" mythology, which had been developed out of the former by a priestly class. The Dane, Henry Peterson showed that Odin had not always been the chief god, and that in many places, especially in Norway and Iceland, Thor had been the most popular deity. In 1881, the Norwegian philologist, Elseus Sophus Bugge (q.v.) tried to prove that much of Snorri's cosmogony exhibited Christian-classical influences; and later scholars, such as Axel Olrik, Kaarle Krohn, and C. W. von Sydow, have confirmed certain details of this theory. Norwegian scholars like Magnus Olsen and Oluf Rygh have extracted further valuable information concerning actual worship from place names.

It has been shown that the contents of the Eddas is *myth,* which often differs sharply from *faith* and *rite,* and is far more easily influenced by cultural contacts. The Germanic peoples were in constant touch with nations to the south, and learned from them in varying ways and degrees. Like other elements in their culture, the conceptions of their gods underwent constant growth and development. Among the earliest historical knowledge of the Germanic peoples is the fact that primitive fertility practices were associated with a goddess called Nerthus, who Tacitus claimed was the favorite German deity in the first century. But the name is identical with the male Scandinavian Njorth, an older god who plays a fairly modest role in the Eddas. Fertility is further suggested by the name Frigg (which is cognate with the Greek Priapus), as well as Frey and Freya. Another old god is Tyr, who was probably at one time an important sky-god, for he bears the same Indo-European name as the Sanskrit Dyaus, the Greek Zeus, and the Latin Ju-piter; but he is definitely a minor god in the Eddas. These early gods seem to have been partly displaced by Thor, who was very popular in Scandinavia before the birth of Christ. But in the following centuries the worship of Odin (whose name is cognate with the Latin *vates,* or "inspired prophet," and the German *wehen,* "to blow"), who was known as a wind god and leader of the souls of the dead, spread north from the Rhine valley. His association with magic, cunning, and poetry appealed to the viking chieftains, while the common people continued to worship the robust, earthy Thor. Last of all came such a figure as Balder, who can hardly be anyone but Christ: there is not a single place name to indicate that a temple to him had ever been raised, and his own name means simply "lord."

According to Jan de Vries, such elements as the world tree may go back to common Indo-European beliefs, or, as Adolf Schröder main-

tains, they may have been borrowed from the Near East, as parallels can be found in Persian, Iranian, and Greek myths. Similar influences can be traced in the concept of Ragnarok, with its obvious parallels in the Apocalypse and in Iranian religion. Although it seems impossible to disentangle all the details of its development, it is clear that Scandinavian mythology is neither a wholly native nor a wholly borrowed product. Once definite personalities for the gods had developed, it was a short step to filling out their biographies with the most miscellaneous folklore material, and from this aggregate the poets and mythographers created the fascinating structure known as the mythology of the Eddas. Originally a faith, this mythology developed into literature, and became a source of poetic metaphor for the skalds of the Viking Age. It was this sophisticated form of Scandinavian religion which Snorri recorded; the actual rites of worship he either did not know or as a Christian did not care to record.

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SCANDIUM, in chemistry a rare metallic element discovered by Lars Nilson (1879) in the mineral euxenite; symbol Sc.

SCANNELL, Richard, American Roman Catholic bishop: b. Cloyne, County Cork, Ireland, 12 May 1845; d. 8 Jan. 1916. He was educated at the College of Middleton, Cork, and at All Hallows College, Dublin, at which latter place he was ordained priest, 26 Feb. 1871. He came to the United States the same year and was appointed assistant in Saint Mary's Cathedral, Nashville, Tenn. He served successively at Saint Columba's Church and as pastor of Saint Mary's Cathedral, 1871–85, being administrator of the diocese of Nashville, 1880–83; and as pastor of Saint Joseph's Church, West Nashville, which he organized, 1885–87. On 9 June 1887 he was appointed bishop of the diocese of Concordia, Kan., and was consecrated in Saint Mary's, Nashville, 30 Nov. 1887, by Archbishop Feehan, assisted by Bishops McCloskey and Rademacher. Upon the death of the Rt. Rev. Jas. O'Connor he was transferred 30 Jan. 1891 to the diocese of Omaha.

SCANSORES, skăn-sō'rēz, an obsolete order of birds represented by cuckoos, woodpeckers, parrots, toucans and trogons, and the like, popularly known as that of the "climbing" birds, and distinguished primarily by the fact that the toes are directed two forward and two backward. It was an artificial group, whose members have been scientifically re-classified in the *Coraciiformes* and other groups, and are also known as *Zygodactylæ,* from the arrangement of their toes. Compare NATATORES.

SCAPA FLOW, a body of water about 50 square miles in area, south of Pomona, the largest of the Orkney Islands, and enclosed also by Burra, South Ronaldsay, Flotta, and Hoy. It is one of the safest harbors in the world and, during the World War, 1914–18 and from 1939 was the main base of the British Grand Fleet. Here the German fleet was surrendered to the British in November 1918 only to be scuttled 21 June 1919.

SCAPE-GOAT, a goat which according to the Mosaic law was sent into the wilderness, on the Day of Atonement, bearing the sins of the people (see Lev. xvi, 1–6; Matt. xii, 43; Luke xi, 24). Under later Jewish practice the goat was thrown over a precipice about 12 miles from Jerusalem. Hence the term "scapegoat" is applied to any person who is made to suffer for the wrongdoing of others.

SCAPHOPODA, a class of *Mollusca* of a low type, known as fossils from the Devonian to the present, and surviving in only a small number of forms, typified by the tusk-shells (*Dentalium*). The head is rudimentary, the mantle-edges ventrally concrescent, forming a tube opening before and behind, and covered with a slight-curved shell shaped like an elephant's tusk. The body has its dorsal side toward the concave side of the shell, and is attached to the shell by muscles near the posterior or pointed end. The foot, which can be protruded from the anterior or wider aperture, is rather long, pointed and has sometimes two lateral lobes. All are marine, and some species live in very deep water. Consult Cooke, 'Mollusca' (London and New York 1895).

SCAPOLITE, the name of an important group of rock-forming minerals, including the species meionite, wernerite, mizzonite, marialite. Of these minerals wernerite (q.v.) is by far the commonest. All the species of the group crystallize in the tetragonal system and are hemihedral. Their color is generally white, gray or flesh-red; hardness, 5 to 6.5; specific gravity, 2.57 to 2.74. They are all silicates of aluminum, calcium and sodium; chlorine is also often present. Their composition has been explained by Tschermak by placing meionite at one end of the series with a typical formula of $Ca_4Al_6Si_6O_{25}$ and marialite at the other end with a typical formula of $Na_4Al_3Si_9O_{24}Cl$, and assuming that wernerite and mizzonite are isomorphous combinations of these two compounds in varying proportions. The scapolites are thus an interesting group of minerals similar to the feldspars in their formation of a series of compounds gradually varying in composition, the silica, soda and chlorine increasing as the alumina and lime decrease. Scapolites occur abundantly as primary minerals in Archæan rocks in limestone and gneiss; meionite occurs in the volcanic rocks of Vesuvius, but with this exception, the scapolites occur in eruptive rocks only as secondary minerals, being products of the alteration of feldspars.

SCAPULA. See ANATOMY; OSTEOLOGY; SHOULDER-JOINT.

SCAPULAR, or **SCAPULARY,** an article of attire worn over the shoulders (*scapulæ*) by the inmates of monastic houses. Originally, in the Benedictine Order, it was worn over the regular monastic dress by the brethren when engaged in manual labor, but it is now part of the ordinary habit of the older religious orders, whether of monks or of friars. The word, however, is now commonly used to signify a sort of emblematic scapulary, consisting of two small squares of cloth held together by strings, from which the pieces of cloth are suspended so that one square reaches to the breast and the other to the back at the shoulder blades of the devotee who wears the scapular. There are several different kinds of these scapulars, to the wearing of which are attached sundry obligations and sundry spiritual privileges, such as indulgences, participation in the merits and the prayers of their fellow-members of a scapulary confraternity, etc. These miniature scapulars were brought into use in the 13th century by Saint Simon Stock, an Englishman and general of the Carmelite Order.

SCAR-TATTOOING. See TATTOOING.

SCARABÆIDÆ, skăr-ĭ-bē'ĭ-dē, an exceedingly large family of beetles, including the most gigantic forms, although some of the species, as the chafers, dung-beetles, etc., familiar in the United States and Europe, are of moderate or small size. The terminal segments of the antennæ are composed of flattened plates, producing comb-like clubs. Unlike those of their relatives, the *Lucanidæ,* these plates can be brought closely together so the club appears compact. These plates are relatively larger in the males than in the females. The pronotum, especially in the males, is often ornamented with conspicuous and curiously shaped horns whose purpose is unknown as in the rhinoceros beetle. In structural detail and habits the members of this family differ widely among themselves. Some feed on manure. Certain American species roll together balls of dung wherein they lay their eggs, thus providing food for their grubs. Very many feed on plants, the beetles eating leaves; the larvæ the roots. The grubs are white and fleshy, usually bent into a semi-circle; the large head has powerful mandibles and no ocelli; the body-segments are often transversely wrinkled, and the hindmost segment is often greatly swollen. Some of the adult *Scarabæidæ* are dull black — the dung-beetles for example; while others are of bright metallic hues. The family ranges all over the world, but is most abundant in tropical countries. Several species are serious pests; for instance, May beetles or June bugs the larvæ of which feed on grass roots and when numerous destroy pastures and lawns and rose beetles, the adults of which destroy roses, grapes, etc. Rotation of crops eliminates the pests, and spraying with extra strength, sweetened arsenate of lead as an insecticide is one of the best preventives to control the scourge. A typical example of the group in the sacred beetle of Egypt (see SCARABS), whose carved images are called scarabeids.

SCARABS, representations of the sacred beetle found on Egyptian gems, coins, mummies, obelisks, and works of art. The appearance and rapid multiplication of beetles in the mud on the subsidence of the Nile gave rise to the belief in their spontaneous generation, and they became the symbol of creation and creative power. Their circular shape and the bright, golden tints of their wing-cases suggested the shape and lustre of the sun. Thus they were taken to be one of the forms under which the sun-god appeared. Accordingly, scarabs were cut in stones and employed as seals and amulets, and after being bored through lengthwise were strung like beads, and easily worn on the person. After the commingling of the Egyptian with other races, Gnostics and Christians interpreted the meaning of these gems in accordance with their own religious systems. Those of the most ancient period, such as are found on mummies, are inscribed with the names of the kings held in highest veneration, Thutmosis III, Rameses II, and Amenophis III, and frequently with some hieroglyphic symbol. The larger of them have some short religious or historic inscription on their under side.

SCARAMOUCH, skăr'ą-mowch, term derived from Scaramuccia, a famous Italian buffoon, who acted in England in 1673, and died in Paris in 1694; applied to one of the grotesque characters of the Italian stage, who was dressed entirely in black, wore a mask, and represented the swaggerer and poltroon. In France the scaramouch was used for a greater variety of parts.

SCARBOROUGH, skär'bŭ-rō, **John,** American Protestant Episcopal bishop: b. Castlewellan, Ireland, 25 April 1831; d. Trenton, N. J., 14 March 1914. He came to the United States when very young, was graduated from Trinity College, Hartford, in 1854, from the General Theological Seminary in 1857, and was ordained to the priesthood in 1858. He was assistant rector of Saint Paul's, Troy, in 1857–60, rector of the Church of the Holy Comforter, Poughkeepsie, N. Y., in 1860–67, of Trinity Church, Pittsburgh, Pa., in 1867–75, and in the last-named year was consecrated bishop of New Jersey, where he remained until his death.

SCARBOROUGH, William Sanders, American educator: b. Macon, Ga., 16 Feb. 1852; d. Wilberforce, Ohio, 9 Sept. 1926. He was graduated from Oberlin in 1875, and occupied various chairs at Wilberforce University, of which he was vice-president 1895–1908, and then president. He was of African descent and was actively interested in the education and uplifting of his race. His publications include 'First Lessons in Greek' (1881); 'Our Political Status' (1884); 'Birds of Aristophanes' (1886), etc. He was an authority on Hellenistic and Classical Greek, negro folklore, and philological and archæological subjects.

SCARBOROUGH, England, in the county of York (North Riding), popularly known as «The Queen of English Watering Places,» is on the North Sea, 39 miles northeast of York. The main part of the town is on the south bay, and rises in successive terraces; the new quarters are divided from the older by a deep ravine crossed by two bridges. The modern period of the town dates from the discovery of mineral springs in 1620. The Grand Hotel, on Saint Nicholas Cliff, is one of the largest in England. There is a fine aquarium, a museum

— a Roman Doric rotunda — a mechanics' institute, and the Spa and its grounds are attractive features of the place. There are fine promenades. The People's Park occupies both sides of the valley. Fishing and the manufacture of jet ornaments are the chief occupations. The Romans erected here a number of signal stations as part of the defense of Britain against the Saxons. The remains of one such station was unearthed in 1925. The castle erected about 1136 was held against the Barons by Piers Galveston, and it was twice besieged by the Parliamentary forces. Later it became a fortified barrack. In 1914 it was bombarded with a loss of civilian life by a German squadron. German submarines attacked the place in 1917. Pop. 46,192.

SCARBRO, W. Va., town in Fayette County; 10m. SW. of Fayetteville, on the Chesapeake and Ohio Railroad. The chief industry is coal mining, the famed New River smokeless coal being produced here. The town is situated at an altitude of 1,800 feet and was named for the English town of Scarborough. Pop. 969.

SCARECROW, The. The prolific pen of Percy Mackaye has never turned out a more satisfactory drama than this, called by him «a tragedy of the ludicrous.» It is clearer in its philosophical purpose, more skilful in its dramatic treatment, more direct in its human application than anything he has yet done. When it was given in New York, at the Garrick Theatre, on 17 Jan. 1911, with the excellent support of Frank Reicher, as Ravensbane, and Edmund Breese, as Dickon, a Yankee improvisation of the Prince of Darkness, it met with the cordial recognition it deserved. Were repertory the fashion in the present generation in the American theatre, it would occupy a worthy place among the plays for constant revival.

The inspirational source for 'The Scarecrow' is Nathaniel Hawthorne's 'Feathertop,' a tale included in his 'Mosses from an Old Manse'; Mr. Mackaye acknowledges his dependence on the story for the main ideas of his plot. But he writes an introduction to the printed play, showing the main details in which he and Hawthorne differ. These may be summed up briefly: Hawthorne's Scarecrow «is the imaginative epitome or symbol of human charlatanism,» the satire being aimed against fashionable society. Mr. Mackaye stretches his philosophy to wider application. His Scarecrow, Ravensbane, is the «emblem of human bathos.» Are we not all more or less human scarecrows, composed of rubbish, out of which we have to hew our own salvation? When Dickon and Goody Rickby construct a scarecrow, and breathe into him, by their devilish magic, the breath of life, symbolized by the glow of a pipe, which keeps Ravensbane alive, they do so in order to wreak vengeance on the old justice, Gilead Morton. But they give no thought to the tragedy which might befall a scarecrow thus thrust upon the world and subject to human experience. They do not realize that when, at the end, in love with the justice's niece, Ravensbane looks into the magic mirror, which reveals people as they really are, he will see himself as a scarecrow, and the tragedy of the ludicrous, so entertaining to the onlooker, will fall heavily on his own poor pumpkin head.

«What absurdity is our highest consummation!» writes Mr. Mackaye; «Yet the sense of our highest deficiency is, after all, our salvation. There is one reality which is a basic hope for the realization of those dreams. This sense is human sympathy, which is, it would seem, a more searching critic of human frailty than satire. It is the growth of this sense which dowers with dignity and reality the hollowest and most ludicious of mankind, and becomes in such a fundamental grace of character.»

Where Hawthorne ends, therefore, so Mackaye claims, his play begins; where Hawthorne's shafts hit charlatanism, he mingles human sympathy with irony, and there is for Ravensbane, the scarecrow, the same feeling of pity that one feels, now and again, for Don Quixote. In his object the dramatist succeeds well. With the result that 'The Scarecrow' may be accounted a good drama, admirably fulfilling its purpose, and admirably reflecting New England temperament of the early witchcraft days.

MONTROSE J. MOSES.

SCAREY CREEK, Engagement at. On 2 July 1861 General McClellan, then preparing to advance from Buckhannon against the Confederate forces under General Garnett at Rich Mountain, ordered General Cox to move with one brigade from Camp Dennison, Ohio, cross the Ohio River at Gallipolis, and operate in the Kanawha Valley, the object of the movement being to secure McClellan's right flank and to prevent General Wise from reinforcing Garnett at Rich Mountain. With three regiments Cox arrived at Gallipolis, where he was joined by another regiment, and on the 10th crossed the river to Point Pleasant, where he received orders from McClellan to drive Wise from the Kanawha Valley. Cox went up the Great Kanawha on steamboats, and at the mouth of Scarey Creek, on the south side of the river, found his passage disputed by a force of 200 men, with two guns, under command of Colonel Patton. It was necessary to dislodge Patton, whose two guns commanded the river. A small body of Cox's command had reconnoitered the position, and awaited the arrival of Cox's main body, which came up on the 16th. Cox landed on the north side of the river, and on the 17th Colonel Lowe, with the 12th Ohio, two companies of the 21st, and some cavalry, in all 1,020 men and two guns, was landed on the south side of the river and advanced upon Patton, reaching the bank of the creek about 3 P.M. The two guns were put in position and the cavalry advanced, but were speedily driven back by the Confederate guns. The artillery now opened on both sides and, after some sharp firing, Patton's men were seized with a panic; but reinforcements coming up, they were rallied, and the Confederates advanced and took position along the bank of the creek across which there was quite a severe contest. A small Union force was sent across the creek to turn the Confederate left and seize their guns; but, not waiting for this movement to develop, the main body charged across the creek and drove the Confederates up the hillside, back upon their guns, and another panic ensued. But more reinforcements coming up, the Confederates rallied and poured such a telling fire into the advancing Union line that it fell back in

disorder, leaving dead and wounded on the field, recrossed the creek, and continued the retreat. The Union loss was two officers and 12 men killed and 47 men wounded; the Confederate loss one officer and four men killed and nine wounded.

SCARIDAE, a large family of fishes, represented by the parrot fishes, which occur in all warm seas, lingering about coral reefs and weedy rocks. Few species are of any value as game or for food. See also ICHTHYOLOGY.

SCARLATINA. See SCARLET FEVER.

SCARLATTI, skär-läa'tē, **Alessandro,** Italian composer: b. Trapani, Sicily, 1659; d. Naples, Italy, Oct. 24, 1725. Appointed maestro di capella by Queen Christina of Sweden, he wrote his first opera for performance in her palace. He produced his first oratorio *I Dolori di Maria sempre Vergine,* in 1693, and was then appointed maestro di capella to the viceroy at Naples. He held the position of chapelmaster at Santa Maria Maggiore, Rome, 1707–1709, and then returned to Naples. Scarlatti was possessed of great fertility of imagination. In method he opposed the enemies of the counterpoint, being considered the greatest contrapuntist of his age, and the inventor of accompanied recitative. His compositions, few of which have been published, included 115 operas, 200 masses, 9 oratorios, 500 cantatas, and miscellaneous minor pieces. Three of his operas, *Geroue; Il Flavio Cuniberto;* and *La Teodora Augusta,* preserved in the original manuscripts, are at Christ Church, Oxford, England, and another is in the British Museum.

SCARLET FEVER (SCARLATINA). An acute contagious disease commonly affecting children in the first decade of life, characterized by inflammation of the pharynx, a punctate erythematous rash, and later, by desquamation of the skin. It is caused by a variety of hemolytic streptococcus, specifically, the *streptococcus scarlatinae.* It is of interest to those who study medical history that the disease received its name, *scarlatina,* from Thomas Sydenham (1624–1689) who described it clearly (1689), differentiating it from measles. Since Sydenham's time scarlet fever has swept over the world in severe epidemics, and only in the present century has it ceased to be a serious factor in mortality and in the complication of lifelong deafness that, in former days, so often followed in its wake.

The disease is spread in a number of ways: by direct contact with one who has the disease, perhaps in a mild form; by fomites; and by the milk of cows whose udders are infected by the streptococcus. It is believed that persons can transmit the disease for several weeks after infection. This likelihood is responsible for enforcement of a prolonged quarantine. The exact manner in which the infection is introduced is not known positively, but the disease is not transmitted through skin shedding or "peeling," as once was supposed. Scarlet fever is seen most often in the fall and winter months, and its incidence corresponds roughly with the school season. Children who are not immunized against it are easily infected. In tropical countries it is seldom seen. The incubation stage is variable, from three to eight days being the usual limits. Onset is extremely sudden, with vomiting, chills, headache, loss of appetite, and sore throat. The throat soon becomes excessively painful and swallowing is difficult. Vomiting may persist for some time. The fever ranges from 102° to 105°, with a rapid bounding pulse. Examination of the throat will show intense redness, the inflammation extending over the pharynx and palate. Small bright red areas often appear against the darker background of the mucous membrane of the throat, which are characteristic symptoms. The tongue is heavily furred, having a creamy look, the edge presenting an appearance known as white strawberry tongue. Within a few days the whitish aspect disappears and the whole tongue then resembles a bright red strawberry. This is said to be diagnostic of the disease. In from 24 to 48 hours, a rash is observed on the upper parts of the trunk which spreads to the back and, finally, covers the entire body with the exception of the face. The skin rash is a light red, with deeper red spots or papules. Not all scarlet fever rashes are alike in appearance and sometimes the diagnosis cannot be made by that means alone. The eruption fades gradually, disappearing in about a week, as the temperature reaches normal. Peeling of the skin (desquamation) begins with the disappearance of the eruption and is completed in about four weeks. Many cases of scarlet fever do not present the usual symptoms or follow the same course. In severe cases especially, atypical forms will be encountered, but most of these, once known as malignant scarlet fever, are seldom seen today. Severe attacks show exaggeration of all the symptoms, especially the sore throat. The fever may be dangerously high, and delirium is common. In some there is marked edema of the throat, sometimes accompanied by ulceration and a foul discharge. Due to the toxemia, prostration is extreme. Mild cases, on the other hand, may escape notice and remain undiagnosed.

The complications of scarlet fever are numerous. Those seen most frequently are middle-ear disease, sometimes resulting in mastoid inflammation from extension, local suppuration of the throat and neck, acute nephritis, general sepsis with all its ramifications, and arthritis. The last involves several joints usually and unless the purulent variety is manifest, is recovered from entirely. The commonest cause of death is from septicemia, in which the peritoneum, the lung, the pleural cavity, the joints, and the meninges of the brain may be involved. Ordinarily, scarlet fever is not difficult of diagnosis. In the early stages, before desquamation begins, mild cases may not be apparent unless the possibility of the disease being present is kept in mind. Certain drugs—and their name is legion—may produce a rash similar to that of scarlet fever, but sore throat is absent. (A few of the many drugs which may be mentioned in this connection are boracic acid, salicylic acid, antipyrin, arsenic, and belladonna.) The eruption in measles may at times be confused with that of scarlet fever, but its early occurrence on the head and face differentiates it, while desquamation in measles is of a branlike character instead of having the flaky appearance of the shedding in scarlet fever. In the latter there is a leucocytosis while in measles there is a decrease in the white blood cells (leucopenia). The Dick test, the injection of a skin test dose (0.2 cc. of a 1 to 1000 dilution of scarlet fever toxin) into the skin of the forearm is

positive if given early, as it is in healthy non-immunes. A positive indication is the formation, in the first 24 hours, of a red area at the site of the injection. The Schultz-Charlton test, or phenomenon, is of some value but is not always to be relied on. Convalescent serum (0.1 cc.) is injected into a red area in the skin during the stage of the rash. If an area of whitening (blanching) is seen at the site, the rash is due to scarlet fever.

In the treatment of scarlet fever, health laws in various communities require, as a rule, isolation and quarantine for from four to six weeks, or even longer if active organisms remain in the tissues. Those who have never had the disease are also quarantined, if they have been exposed, for the maximum incubation period of eight days. Under prophylactic treatment, immunization is recommended usually, for those who have not had the disease or who give a positive Dick test. For immunization, five weekly subcutaneous injections of ascending doses of scarlet fever toxin are given as recommended by the Scarlet Fever Commission. Immunity is acquired in about three weeks after completion of the course. Severe systemic reactions may occur from injection of the toxin, especially in very young children.

Specific therapy includes the following measures: the use of scarlet fever antitoxin in a single dose of from 15,000 to 40,000 units given intramuscularly or, in urgent cases, intravenously; the use of convalescent serum obtained from a single person or, preferably, from a considerable number of individuals, in a single dose of 40 to 100 cc.; the administration of sulfonamides, especially sulfadiazine, in doses up to 650 milligrams, several times a day orally, or intravenously (in which case the sodium sulfadiazine is chosen), until the temperature becomes normal. Convalescent serum is said to be fully as effective as antitoxin without the former's tendency to cause a severe reaction. Sulfonamides do not affect the toxic stage and do not lower the temperature nor aid the sore throat. They do influence the mortality and the occurrence of complications, probably decreasing their severity. In spite of the wide acceptance of the Dick test, as claimed by its proponents who believe that 90 per cent of those receiving proper immunization are protected for life, there are many who question the value of present methods of Dick testing and immunizing. They maintain that the toxin does not represent all strains of streptococci present in scarlet fever, that the test is not always reliable, that it is not possible to achieve complete active immunity against the streptococcus, that the test is difficult to interpret, that attempted immunization causes the rash to disappear and thus a valuable diagnostic aid is lost and that immunity is transient and practically never permanent.

Treatment other than specific consists of rest in bed with careful nursing, an easily digested diet for several weeks, a generous fluid intake, care of the bowels and skin, local treatment of the throat and nasal passages, and a careful watch for complications, especially nephritis and middle-ear disease. (The question of complete isolation of the nurse, with separate living quarters, and so forth, is still debated. Sterilization of dishes used in the sick room and burning of all garbage is insisted upon in many quarters.) The prognosis is not always to be determined in the individual case, since mortality may vary from 3 to 40 per cent according to the particular epidemic. In general, mortality is in inverse ratio to the age of the patient, younger children succumbing much more easily than those of eight or ten years. An attack of scarlet fever confers immunity for life. Consult Yater, Wallace M., *Fundamentals of Internal Medicine,* 2nd ed. (New York 1942).

HAROLD W. JONES, M.D.

SCARLET IBIS. See IBIS.

SCARLET LETTER, the first and by general consent the greatest of Nathaniel Hawthorne's four chief romances, was originally planned as a short tale, and was expanded to its present proportions on the urgent advice of the author's friend and publisher, James T. Fields. When, with the change of administration in 1849, Hawthorne was removed from the surveyorship of customs at Salem, he undertook a collection of short pieces that might have borne to the custom-house, where he had worked, the same relation that his preceding collection had borne to the Old Manse, where he had lived. An introductory sketch, *The Custom-House,* written for this collection, is always prefixed to *The Scarlet Letter,* though it has no real connection with the romance, and though it contains some unfortunate personalities which show the writer's ill-temper over the loss of his position. The account in this sketch of the finding of a moth-eaten embroidered "A" and a manuscript in the upper rooms of the custom-house is of course fanciful. Years before, in the tale of *Endicott and the Red Cross,* Hawthorne had made incidental mention of a woman who was forced to wear a scarlet "A" in token of her guilt, and the thought of this punishment, or rather of its effect on the wearer, seems to have remained with him until it resulted in the creation of Hester Prynne. *The Scarlet Letter* was published in the spring of 1850, and instantly won for the author a recognition that had been denied to the delicate and finished shorter tales of his earlier collections. Its reputation in America has increased rather than diminished with time, and it has been warmly praised in England. In other countries it is less known, perhaps partly because many of its effects are too subtle for translation, partly because the peculiar New England quality is not readily appreciated by those of another race. *The Scarlet Letter* is in every way typical of Hawthorne. The background is colonial New England, and the theme is the effect of a great sin on the four persons most concerned—Hester Prynne, who wears the scarlet letter, her paramour, the wronged husband, and the child who is the offspring of illicit love. When the tale opens, the sin is a thing of the past, and the judgment of the law has been imposed. The author passed by the story of love, temptation, yielding, and discovery, and beginning where another novelist might have ended he traced the moral and spiritual tragedy which followed. Even in the handling of this material he made no use of the ordinary devices of the storyteller. Thus, the identity of the guilty man, which might have been so treated as to arouse curiosity and then revealed with startling effect, is allowed to transpire quietly. The chief contrast is between Hester, who suffers

openly, and her partner in guilt, who maintains his honorable position in the community unsuspected; and the lesson which is most likely to be drawn is that of the virtue of open expiation, and the evil of concealment, even where there seem to exist the strongest arguments against confession. In the author's own words, «Be true! Be true! Be true! Show freely to the world, if not your worst, yet some trait whereby the worst may be inferred!» A secondary moral, the deadening effect of a secret and long-continued plotting for revenge, as seen in the husband, Chillingworth, is almost too obvious. Yet 'The Scarlet Letter,' while it is sure to stimulate thought, is not in any sense a preachy book. The reference in the conclusion to Hester's belief in «a new truth» which should «establish the whole relation between man and woman on a surer ground of mutual happiness,» is somewhat perplexing, but has probably been taken by radical social reformers more seriously than the author intended. Throughout the book the thought of the scarlet letter, both as a material object and as a symbol, is everywhere present, and is woven into the tale with even too great ingenuity. It is personified in the child, Pearl; it seems to imaginative observers to be flashed in the heavens by the track of meteors; and as we are led to believe, it was burned in penance on the breast of the guilty man. The background, the characters, like the demented witch-sister of the governor, the incidents, and the motive unite to sustain throughout the romance a uniform tone — sombre, tragic, unbroken from first to last by a trace of humor, and still neither morbid nor repellant. It would have been a great achievement to tell such a story for the select few who are fond of subtle psychological analysis; it is marvelous that Hawthorne made a tale, in which nothing outward happens, appeal to the mass of readers who are accustomed to demand constant action.

WILLIAM B. CAIRNS.

SCARLET TANAGER. See TANAGER.

SCARLETT, SIR **James Yorke,** English soldier: b. 1799; d. December, 1871. He was educated at Eton and Cambridge, entered the army, and in 1854 was sent to the Crimea in command of the heavy brigade. On the 25th of October he led the brigade in its famous charge at Balaclava, and later in the day it brought out of action the remnants of the light brigade after its even more famous charge. In both of these actions Scarlett took a prominent part in the hand-to-hand conflict. For these services he was promoted to the rank of major-general, on 12 December following, and upon the retirement of Lord Lucan took command of the entire cavalry forces in Crimea. In July 1855 he was created a K.C.B. He commanded the camp at Aldershot 1865–70, and retired from active service in the last-named year.

SCARP. See FAULT; also ESCARPMENT.

SCARPA, skär'pä, **Antonio,** Italian anatomist: b. Friuli, Italy, 13 June 1747; d. Pavia, Italy, 31 Oct. 1832. He studied medicine at Padua, in 1772 was appointed professor of anatomy at Modena, and published in that year his first work on the anatomy of the ear, 'Anatomicæ Observationes de Structura Fenestræ rotundæ Auris.' In 1783 he resigned this chair to accept a similar one at Pavia, where he published his great work, 'Anatomicæ Disquisitiones de Auditu, etc.' (1789). At the time of the revolution in Italy he was deprived of his professorship in the university on account of refusal to take the oath required by the Cisalpine republic. He now published his celebrated work on 'Aneurisms' (1804). When Napoleon, after his coronation as king of Italy, arrived at Pavia (1805), and received the officers of the university, he inquired after Scarpa. He was informed that he had long ceased to be a member of the university, and was told the reason. «What,» said Napoleon, «have political opinions to do here? Scarpa is an honor to Pavia and to any dominions. Let him be honorably restored.» Scarpa was the author of several other surgical works besides those already mentioned. Most of his works have been translated into English and French.

SCARPANTO (Carpathos), one of the Aegean Isles formerly belonging to Turkey, and since 1912 under the sovereignty of Italy. It is 27 miles long by six miles wide, is rocky and mountainous, and has four harbors, two on the east, one on the north and one on the southwest side, known respectively as Port Pernesi and Port Avdemo, Port Skomaco and Port Grato. There are indications pointing to a former dense population, as judged from the numerous ruins of towns. Pop. 11,500.

SCARRON, skä-rôṅ, **Paul,** French author and playwright: b. Paris, France, 6 July 1610; d. there, 6 Oct. 1660. Refusing to take orders he led a wild life in Paris and in Rome, to which city he went in 1634. Shortly after his return to Paris in 1637 he was stricken with an illness which left him a paralytic for the rest of his life. His mind was not affected, however, and he made his livelihood by literature. At one time he was the pensioner of the queen, but losing his pension through the influence of Cardinal Mazarin, he then wrote in revenge his satirical 'Mazarinade' (1649), one of his best-known works. He married in 1652 the young and beautiful Francine d'Aubigne, afterward Mme. de Maintenon. Both before and after this event, which Scarron survived eight years, his house was the centre of a brilliant literary society. The most famous of Scarron's writings in his own time is said to have been his 'Virgile Travesti' (1648–53), but modern critics prefer his 'Roman Comique' (1651). There have been many editions of his works; the best are those published in Amsterdam (10 vols., 1737) and reprinted at Paris (7 vols., 1786).

SCARZONERA, a genus of composite plants with numerous species, chiefly indigenous to the Mediterranean regions. The flowers are yellow or rarely rose-colored, having many series of involucral bracts, plumose and unequal pappus, and achenes without a beak and generally wingless. *S. hispanica,* sometimes known as viper's grass, has long been cultivated for its tapering, fleshy, edible roots, the dark-brown skins of which have caused it to be called black salsify. The leaves are long and lanceolate with waving edges. Other species are also cultivated for their roots.

SCAUP, skâp, or **BLACKHEAD DUCK,** a duck (*Aythya marila*), of the same genus as the redhead (q.v.), which it closely resembles in form but from which the green-glossed black

head of the male and the white face of the female distinguish it. It is a very abundant duck about the shores of the North Atlantic, frequenting the sounds, bays and estuaries of the United States to Central America in winter and in the spring passing northward and inland to breed. On the coasts of the New England and Middle States the scaup is most abundant during the fall migration, occurring in flocks which feed chiefly upon small mussels and other marine animals, especially mollusks, secured by diving.

A closely related species is the lesser scaup duck (*A. affinus*), which is almost an exact smaller counterpart of the blackhead, except that the head of the male is glossed with purple instead of green and the length is about 16 instead of 18 inches. This species regularly consorts with the larger scaup and is altogether similar in distribution and habits. Both species are shot in large numbers by sportsmen and market gunners and regularly sold in the markets, but the flesh is rather coarse and strong-flavored.

SCELIDOTHERIUM. See MEGATHERIUM.

SCELOPORUS, sē-lŏp'ō-rŭs, a genus of lizards of the family *Iguanidæ,* to which the Florida chameleon (*Anolis*) and the horned toads (*Phrynosoma*) also belong. Among its kindred, this genus is distinguished by its imbricated keeled scales, the absence of a dorsal crest, of gular folds or a gular sac and of head-spines. The tympanum or ear-drum is exposed between the small scales of the side of the head; the tongue is fleshy and shaped somewhat like an arrowhead; teeth are confined to the jaws and have trilobate summits. Femoral pores, the secretion of which assists the sexes in mating, are well developed. Between 30 and 40 species of this genus are known, all of them American and most of them confined to Central America, Mexico and the southwestern United States. In this region these lizards are exceedingly abundant and are everywhere conspicuous objects. They are chiefly terrestrial, but many of the species also live upon stone walls or fences or run up tree trunks when alarmed. Their food consists of insects, which they seize with the greatest agility. In temperate regions they hibernate in cold weather. The males are generally ornamented with bright colors on the under parts which may be considered to be secondary sexual characters. The eggs, which have a parchment-like shell hardened with lime, are usually retained in the oviducts until the young are partly or wholly developed; when deposited, holes in the ground, decayed stumps, etc., are utilized for their concealment. As in many other lizards, the tail is easily broken along an unossified plate across the body of the vertebræ, after which it regenerates, but always imperfectly. The only eastern species is the common swift or fence-lizard (*S. undulatus*). Consult Cope, 'The Crocodilians, Lizards and Snakes of North America' (United States National Museum, Washington 1900).

SCENES OF BOHEMIAN LIFE, The, by Henri Murger (1822–61), though published at the beginning of his literary career (they began to appear in the periodical press in 1847) mark the highest point in his achievement. His poetry (he always believed himself a poet) has not stood the test of time, and his later novels are outranked by their predecessor. This suffices, however, to give him his place which is larger in the affectionate remembrance of his compatriots than in French literary history, for his success was due to the peculiar optimism and buoyancy of his temperament rather than to any special artistic quality. This temperament allowed him to regard his own difficult and harassed life as a subject for comedy and high-spirited rejoicing. His famous work frequently reproduces scenes and incidents in his own experience. The son of a Paris janitor and tailor, he was driven from home as a lad and in his effort to win recognition as a poet was reduced to a condition of starvation which resulted in impairing his vitality and frequently brought him into the wards of Paris hospitals. To support himself he was at intervals, like his hero Rodolphe, reduced to uncongenial and often unpaid tasks on cheap ephemeral trade journals like the *Scarf of Iris* or *Beaver* (*Le Castor*) of the *Scenes.* On one ever memorable occasion he, however, received for past and future services 500 francs, which provides one of the well-known incidents of his story. The indulgent ever-smiling young *Bohémiennes,* like Mimi and Phemie and the rich young lady cousins, never if ever appeared in the doorway of his garret where he toiled unremittingly for success. It is for this reason that it is no true picture either of his own struggle or of the hard-working and serious life of the Latin Quarter of his time, which, though it had its rare gala days of festival and high spirits, had also its long months and years of unrequited toil that often ended in final poverty and failure. For this reason those who know «Bohemia» best refuse to recognize Murger as its portrayer. A truer picture is to be found in the biographies of Balzac or Zola or Daudet, who passed through its toil and trials before or after this time. It should also be remembered in this connection that of the hundreds of talented young men who struggled with them only a very small percentage won lasting recognition or any financial reward. Murger was, therefore, not in any sense a realist but a delightful humorist and idealist who created certain exaggerated but ever fresh and amusing types and who made a life of toil against heavy odds, relieved by the joys of youthful comradeship and kindred aims, appear as one long and uninterrupted holiday. This exaggeration of type is the reason why his heroes and heroines with but little change make the strikingly successful characters of the light opera by Puccini based upon his work. It was Bohemia as he would have wished it, but as it never was for him or his serious brothers in the fellowship of art. See BOHÊME, LA.

CHRISTIAN GAUSS.

SCEPTICISM, in its widest meaning, is a state of doubt or suspense of judgment. It is often used in connection with religious belief, and here indicates doubt or disbelief of authorized doctrines. The word scepticism has a specific meaning, however, which is implied in its more general uses, and in this meaning it has a philosophical reference and relates to the problem of knowledge. Thus used, scepticism signifies systematic doubt or entire disbelief in

the ability of the human mind to attain knowledge of positive or objective truth. Such scepticism has been of frequent occurrence in the history of thought from antiquity to the present time. It has received systematic expression from several noted thinkers who supported their conclusions by explicit arguments. The grounds of systematic scepticism are many and cannot be given in full detail. Its fundamental basis in theory is usually found in the assumption that knowledge arises from a succession of particular sensations which are (1) subjective modifications, and (2) detached and transitory mental states. As subjective modifications, these sensations are the product of the sense-organs of the individual. Their nature depends upon the structure of the particular sense-organ, which varies with each individual, and also upon the bodily condition of the individual which varies from moment to moment. Hence these sensations, being relative to individual structures and conditions, have only a subjective value, and can yield no truth that is objective and necessary for all. As detached and transitory mental states, these sensations can furnish no criterion of truth beyond the single sensation. Because detached and particular, such a single sensation can justify no conclusion of universal validity. Because itself transitory, such a single sensation can reveal nothing of a permanent and abiding reality. Beside these theoretical considerations, many practical reasons have been urged to support scepticism, such as the difference of opinion and belief among different peoples upon most vital matters of life and morals. In antiquity the first important exponents of scepticism were the Sophists of Greece. Of this school Protagoras held that all truth was relative, since all sensations were subjective. At a later period in Greek thought, a systematic scepticism was developed by Pyrrho of Elis and elaborated by his school. According to the Pyrrhonic scepticism, the real nature of things is entirely unknown to us because of the subjectivity of our impressions and opinions; and, consequently, our proper attitude is one of suspense in judgment and apathy in conduct. The foremost representative of scepticism in modern times is David Hume. He maintained that "all knowledge resolves itself into probability"; for, being based upon particular impressions, it can reveal nothing of permanent or objective reality beyond the succession of sensations. In estimating the importance of scepticism in the history of thought, one must distinguish between scepticism as (1) a provisional stage and (2) a final conclusion of thought. As a provisional stage, scepticism has discharge an important office in the development of thought. In the life of both individual and race, periods of scepticism are useful in disposing of traditional beliefs which lack adequate foundation, and so in preparing the way for better-established conclusions. Thus with Descartes a stage of doubt was preliminary to his positive thought, and likewise the scepticism of Hume was preliminary to the constructive philosophy of Kant and his successors. As a final conclusion scepticism has never been permanently satisfactory, because the inherent demand of the human mind is for positive truth.

Consult Plato, 'Protagoras'; Zeller 'Stoics, Epicureans, and Sceptics' (tr. London 1892); Hume, 'Treatise of Human Nature'; Owen, 'Evenings with Sceptics.'

SCEPTRE, originally a staff, the emblem of sovereign power. The baton, or short sceptre, has always remained a sign of distinction. In the Greek assemblies a person who wished to speak received a sceptre from the herald; and the judges also bore it while in the exercise of their authority. Kings swore by the sceptre. By degrees it became the emblem of power alone. Through the Roman emperors it passed to the western monarchs.

SCHAAFFHAUSEN'SCHER, A., (shâf-hou'zĕn-shĕr bănk-fĕr-īné,) **BANKVEREIN.** The A. Schaaffhausen'scher Bankverein of Cologne was founded in 1848 as a reorganization of the firm of Abraham Schaafhausen (seriously affected by the troubles of the same year), with a capital of 5,187,000 thalers (about 15,600,000 marks), of which the initial issue was 3,199,800 thalers. In 1914 it was absorbed by the Disconto-Gesellschaft (q.v.), retaining its name and clientele under the management of W. L. Deichmann, Gustav Mevissen and Victor Wendelstadt, men of caution and experience, the institution began its activities in the fostering of important industrial enterprises. Its purpose may be inferred from an excerpt from the annual report for 1852 — "the function of a great banking institution is not so much to start new branches of industry through extensive participation, as to induce the capitalists of the country, by recommendations based on exhaustive investigations, to turn idle capital toward such enterprises, which, when properly launched, in response to existing requirements, and offering the guarantee of expert management, bid fair to yield reasonable profits." Industrial in purpose, current account business was secondary, and deposits were received only on condition of three, six and 12 months' notice being given for their withdrawal, and then only at a low rate of interest. The close identification from the first with the prosperous and flourishing Rhenish-Westphalian industry, and the strict adherence to its original purpose, lent strength to the Bankverein to weather the financial crisis of 1857 without the necessity of canceling any of its outstanding credits — a strong factor in extending its influence during succeeding years. One after another it nurtured industrial enterprises within its banking zone, each becoming an added source of strength for the Bankverein. In 1891 a branch was opened at Berlin — a branch in fact as well as name — the parent institution remaining the only one of the five German "great" banks having its headquarters outside of Berlin. In 1908 the number of branches was 10, with one silent partnership, or "Commandite" and 15 deposit offices. Six subsidiary banking companies were founded wholly or in part by the Bankverein (largely in co-operation with the Dresdner bank), giving foreign banking and exchange facilities, a small incident in the general scheme of the Bankverein. Four German banks with 13 branches were absorbed wholly and another jointly with the Dresdner bank. In addition, through ownership of shares, it maintained community of interest relations with three important banks, having 21

branches and numerous agencies, deposit offices and subsidiary connections. Most important, however, was the community of interest, mutual in terms, between the Dresdner bank and the Bankverein, beginning 1 Jan. 1904. Representation was maintained on the boards of 94 other industrial and financial institutions. The capital of the Bankverein was 145,000,000 marks; and 34,157,125 marks surplus. The total capital power of the A. Schaaffhausen'scher Bankverein group was 278,538,001 marks, of which 231,000,000 marks constituted the capital, and 47,538,001 marks the surplus. Consult Riesser, Dr. J. (1909), 'Die deutsche Grossbanken und ihre Konzentration'; 'Germany's Economic Forces' (1913); 'Report on Co-operation in American Export Trade' (Washington 1916).

SCHADOW, shä'dō, **Johann Gottfried,** German sculptor: b. Berlin, 20 May 1764; d. there, 27 Jan. 1850. After many vain struggles to become an artist, he was admitted to the studio of the sculptor Tassaert and thus at length succeeded in devoting himself to his chosen art. Soon afterward he ran off with his sweetheart to Vienna, and there married her; and then, at the expense of his father-in-law, went to Italy, where he wrought with unwearied diligence from 1785 to 1787 in the museum of the Vatican and of the Capitol, winning a prize by his group 'Perseus and Andromeda.' In 1788 he obtained the position in Berlin which had become vacant by the death of his teacher Tassaert. His first great work was the monument erected in the Church of Saint Dorothea, Berlin, to the memory of the margrave, natural son of Friedrich Wilhelm II. This was followed by the colossal statue of Ziethen in hussar uniform; the statue of Frederick the Great in Stettin; of Leopold of Dessau in Berlin; of Blücher in Rostock; the Tauenzien monument in Breslau; Luther's in Wittenberg, etc. The four-horse chariot of Victory, over the new Brandenburg Gate of Berlin, was modeled by Schadow. Schadow executed many busts of his eminent countrymen and numerous relievos and statuettes. In 1788 he was made rector and in 1822 director of the Academy of Art in Berlin, a position which he retained until his death. He was one of the first of the modern sculptors who dared to withstand the fantastic mannerism of the 18th century for which he substituted a powerful representation of character based on a study of the antique. His most eminent pupil in this respect is Rauch; among his other pupils may be named Dannecker, Tieck and Zauner. His chief literary works are 'Wittenberg Denkmäler der Bildnerei, Baukunst und Malerei, mit historischen und artistischen Erläuterungen' (1825); 'Polyklet, oder von den Massen des Menschen nach dem Geschlechte und Alter' (1834); 'National-physiognomien, oder Beobachtungen über den Unterschied der Gesichtszüge und die äussere Gestaltung des menschlichen Kopfs, in Umrissen bildlich dargestellt' (1835); 'Kunstwerke und Kunstansichten' (1849). Consult Dobbert, 'Gottfried Schadow' (1887).

SCHADOW, Rudolph, son of the preceding, German sculptor: b. Rome, 9 July 1786; d. there, 31 Jan. 1822. He was trained as sculptor by his father and his principal works are 'Spinning Girl'; 'Achiles and Penthesilea'; 'John Baptist' and 'Virgin and Child.'

SCHADOW-GODENHAUS, gō'děn-hows, **Friedrich Wilhelm,** younger brother of the preceding, German painter: b. Berlin, 6 Sept. 1789; d. Düsseldorf, 19 March 1862. He received his first lessons in drawing from his father, then turned to painting and became the pupil of Weitsch. He served in the war between 1806 and 1807 and three years later resumed his artistic studies in Rome, where Cornelius, Overbeck, Veit and others had founded the new school of the Nazarenes (q.v.). He joined their company and from that time made the Italian masters his models, while the favorite subjects of his pencil were biblical, or selected from the mystical and allegorical wonders of mediæval tradition. As in the case of Overbeck, his devotion to this latter field of human imagination led him to become a member of the Roman Catholic Church. He painted 'Heaven's Queen' for Madame von Humboldt and a 'Holy Family' for the Crown Prince Ludwig of Bavaria. The best work he did at Rome is seen in the frescoes for the Casa Bartholdy; 'Jacob with Joseph's Bloody Coat'; 'Joseph in Prison' (both in the Berlin National Gallery). In 1819 he was called to Berlin as professor of the Art Academy there. During his incumbency he painted the 'Bacchanalian Procession' on the proscenium of New Theatre; many portraits; the 'Visit of the Wise Men' in the Garrison Church at Potsdam and another altar-piece for the church at Schulpforta. One of his finest pictures is 'Freeborn Poetry,' a lovely winged maiden rising from earth to heaven. In 1826 he was made director of the Academy in Düsseldorf and with a circle of enthusiastic pupils became the founder of the Düsseldorf school. He retained this connection until 1859, when age and failing sight led him to retire. Among his religious paintings are 'Christ on the Mount of Olives'; 'Christ at Emmaus'; 'The Dead Body of Christ watched over by his Mother surrounded by Angels' (1836). His health drove him to seek a change in the warmer climate of Italy (1840), and at Rome he painted 'Earthly and Heavenly Love'; 'Piety and Vanity in their Relationship with Religion,' the last appearing under the form of the Saviour, and 'Heaven, Purgatory, Hell' after Dante. As an author he wrote 'The Influence of Christianity on the Painter's Art' (1843). His paintings are mostly found in Düsseldorf and Berlin, but one of his best works, the 'Wise and Foolish Virgins,' is in the Museum at Frankfort-on-the-Main. He was perhaps more successful as a teacher and demonstrator than as a creative artist, but he had a very distinct, even though one-sided influence, upon the religious art of Germany. He gave a new and vigorous impulse to the oil painting of his day without resorting to that pre-Raphaelite realism which sometimes lent to the canvases of Cornelius a certain crudeness bordering on the grotesque. Consult Hübner, 'Schadow-Godenhaus und seine Schule' (1869).

SCHAEBERLE, John Martin, American astronomer: b. Würtemberg, Germany, 10 Jan. 1853; d. Ann Arbor, Mich., 19 Sept. 1924. He was brought to Ann Arbor, Mich., in his infancy, and was graduated from the University of Michi-

gan in 1876 as a civil engineer. He devoted himself to the study of astronomy, to which department of knowledge he made valuable contributions. From 1876 to 1888 he taught astronomy in the University of Michigan, and was then called to the Lick Observatory at Mount Hamilton, Calif., where he made several important astronomical investigations. He had charge of the expedition to witness the eclipse at Cayenne in 1889, and of those for the same purpose to Chile in 1893, and to Japan in 1896. During his later years he was engaged in theoretical and experimental investigations on gravitation, light, heat and electricity. He was a frequent contributor to astronomical journals and periodicals.

SCHAEFFER, Nathan C., American clergyman and educator: b. Maxatawny, Berks County, Pa., 3 Feb. 1849; d Lancaster, Pa., 14 March 1919. In 1867 he was graduated at Franklin and Marshall College after which he studied divinity at the Theological Seminary of the Reformed Church and finished his education at the universities of Berlin, Tübingen and Leipzig. From 1875 to 1877 Dr. Schaeffer was professor at Franklin and Marshall College and from 1877 to 1893 was principal of the Keystone State Normal School. In the year last named he became State superintendent of public instruction, a post he held until his death. He also served as president of the State board of education and was president of a commission that prepared a new school code for the State, and was a member of the simplified spelling board. In 1879 he received the degree of doctor of philosophy and in 1904 received the degrees of doctor of divinity and doctor of laws from Dickinson College. He was a prolific writer on educational and religious subjects. His works include 'Thinking and Learning to Think' (1900); 'History of Education in Pennsylvania'; (editor) 'Bible Readings for Schools' (1897); introduction to Hinsdale's 'Civil Government'; Riddle's 'Nicholas Comenius'; 'Life of Henry Harbaugh,' and editor of the *Pennsylvania School Journal* after 1893.

SCHAFF, shäf, **David Schley,** American Presbyterian clergyman and educator, son of Philip Schaff (q.v.): b. Mercersburg, Pa., 17 Oct. 1852. He was graduated at Yale in 1873 and in 1877 was ordained in the Presbyterian ministry. He served as pastor in 1877–1907; was professor of church history at Lane Theological Seminary in 1897–1903; at Western Theological Seminary, 1903–25; and lecturer on church history, Union Theological Seminary, from 1925; delegate, Presbyterian Council, Aberdeen, Scotland, 1913. He was one of the editors of the 'Schaff-Herzog Encyclopedia' (4 vols., 1883); and of 'History of the Christian Church' (Vols. I–II, 1907–10); author of 'Life of Philip Schaff' (1897); 'John Huss' (1915), etc. He translated 'The Church' by Huss (1915). D. Winter Park, Fla., 2 March 1941.

SCHAFF, Philip, American clergyman and scholar: b. Coire, Switzerland, 1 Jan. 1819; d. New York, 20 Oct. 1893. He studied at Tübingen, Halle and Berlin, and was a lecturer in the latter university in 1842–44. He then came to this country where he was professor in the theological seminary of the German Reformed Church at Mercersburg (Pa.) 1844–63. In 1864–69 he was lecturer in several theological institutions, and in 1870 became professor of sacred literature in Union Theological Seminary, New York. This post he held until his transference in 1887 to the chair of church history in the same institution. He was one of the founders of the Evangelical Alliance and went as delegate to its general conferences at Basel in 1879, and at Copenhagen in 1884. He was president of the American Bible-revision committee, organized by him in 1871 at the request of the British committee. He was a prolific writer and editor, his works including 'History of the Apostolic Church' (1853); 'History of the Christian Church' (1867; new and enlarged edition, 7 vols., 1889–92); 'Creeds of Christendom' (1877); 'Schaff-Herzog Encyclopedia of Religious Knowledge' (as editor); 'Dictionary of the Bible' (1880); 'Church and State in the United States' (1888); 'Literature and Poetry' (1890).

SCHAFFHAUSEN, shäf'how-zĕn, Switzerland: (1) Capital of the canton of its own name, situated on an eminence overlooking the Rhine, 24 miles north of Zürich. It is quaintly and irregularly built. The buildings most worthy of notice are the feudal castle of Munot, of Roman construction, standing on a commanding height; the parish or Saint John's Church; and the cathedral (1052), a massive basilica containing a bell whose inscription suggested Schiller's 'Song of the Bell,' and Longfellow's 'Golden Legend'; the town-house (1412); the Imthurneum, containing theatre, concert rooms, etc., the museum containing manuscript collections of Johann von Müller, who was born here, the town library, etc. There are primary and high schools. The environs are beautiful; three miles distant are the celebrated falls of the Rhine, almost 300 feet broad, falling more than 70 feet in three cascades formed by two pillars of rock. The Fäsenstaub is a fashionable promenade. The principal industrial works are the wagon and carriage factories, cotton and woolen manufactories, iron works, distilleries and breweries. Pop. about 21,000. (2) The canton of Schaffhausen covers an area of 114 square miles, and occupies the most northern angle of the Swiss territory. It belongs to the Swabian Jura, and the population uses almost exclusively the German tongue. The canton entered the Swiss Confederation in 1501, and by the constitution of 1876 became exceedingly democratic. Education is compulsory. The taxes are very low. Financially it is the most favored among the Swiss cantons. All the cereals are raised, besides hemp and flax. There is abundance of fruit, especially grapes. The principal manufactures are aluminum, wagons, wool, ropes and watches. Pop. about 51,000.

SCHAFFLE, shā'flĕ, **Albert Eberhard Friedrich,** German political economist and sociologist: b. Nurtingen, Würtemberg, 24 Feb. 1831; d. Stuttgart, 24 Dec. 1903. He was educated for the ministry at Tübingen but adopted a journalistic career. In 1861 he was called to the University of Tübingen as professor of political economy, and in 1868 to Vienna. His principal contributions to the literature of political science are his 'National Economy' (1861-73); 'Capital and Socialism' (1870); 'The Fundamental Principles of Taxation' (1880);

and 'Quintessence of Socialism' (1884, 8th ed., 1885). In 1895 he began to write upon sociological questions and to develop the biological theory of society. His 'Bau und Leben des socialen Kőrpers' is a more detailed attempt to explain society as a living organism than that essayed by any previous writer. This book, completed in 1896, placed him in the ranks of modern sociologists.

SCHAFFNER, Jakob, German novelist: b. Basle, Switzerland, 15 Nov. 1875. He carried on his university studies in his native city, and there he wrote most of his works until he changed the scene of his studies to Charlottenburg, near Berlin, in 1912. His best novels are 'Irrfahrten' (Berlin 1905; title later changed to 'Irrfahrten des Jonathan Bregger' 1912), and 'Die Erlhőferin' (Berlin 1908, 15,000 sold in two years). His early poverty is reflected in most of his works, 'Irrfahrten' ("Wanderings"), for instance, has convincing pictures from the life of working people in their daily toil, while 'Konrad Pilater' is a story of a rather whimsical journeyman shoemaker (embodying scenes of Schaffner's boyhood as a shoemaker). Later books are 'Konrad Pilater' (Berlin 1910); 'Der Bote Gottes' (1911); 'Die goldene Fratze' (Berlin 1912); 'Erlösung vom Klassenkampff' (1920); 'Der Kreiselspieler' (1926). 'The **Iron Idol**' nas appeared in English.

SCHALCKEN, shäl'kĕn, **Godfried,** Dutch artist: b. Dordrecht, 1643; d. The Hague, 16 Nov. 1706. He was the pupil of Samuel van Hoogstraten and Gerard Douw. He visited England where he painted portraits, especially one of William III. His best work is in genre, and here he approached though still remaining inferior to his master Douw. He was fond of representing scenes by candle light, though he was scarcely ever quite true in the color representation of such light. When he attempted portraits in full length, as the fashion of the time of Sir Godfrey Kneller demanded, his efforts were not successful, with the possible exception of the portrait of William III, now in the Amsterdam Museum, but he soon became sensible of his error, and again painted on a small scale. Some of his best works are at the museums of Vienna, Dresden, Munich, Berlin, Amsterdam, The Hague, and at the Louvre.

SCHAMYL, shä'mĭl (Samuel), Tartar imam and warrior, leader among the tribes of the Caucasus: b. Aul Himri, northern Daghestan, 1797; d. Medina, March 1871. From 1824 to 1831 he took energetic part in Kasi Mollah's "holy war" against the infidel Russians, being severely wounded at the storming of Himri. A Sufi, he labored for the recrudescence of his faith in Daghestan, and was markedly successful. From 1837 he was temporal and spiritual head of the mountain tribes. His guerrilla method of warfare long enabled the Circassians to continue the struggle against Russia. During the Crimean War he was supplied by the allies with arms and money. After incredible escapes he was at last taken (6 Sept. 1859), and kept under surveillance, though treated with consideration.

SCHARF, shärf, Sir **George,** English artist: b. London, 16 Dec. 1820; d. Westminster, 19 April 1895. He studied art under his father, a Bavarian artist who had settled in England, and in 1838, after gaining medals from the Society of Arts, entered the Royal Academy schools. In 1840 he visited Asia Minor, and again in 1843 as draughtsman to a government expedition. On his return he devoted himself to painting in oil and to book-illustration, among the books illustrated by him being Murray's 'Prayer Book,' Macaulay's 'Lays,' Milman's 'Horace,' Kugler's 'Handbook of Italian Painting,' Layard's books on Nineveh, Keats' Poems, and Sir W. Smith's Classical Dictionaries. He rendered valuable assistance to the Crystal Palace authorities in planning the Greek, Roman and Pompeian courts, and to Charles Kean in his Shakespeare revivals of 1851–57. He was art secretary to the Manchester exhibition of 1857, and on the foundation of the National Portrait Gallery he began to make a special study of portraits, on which he soon became a recognized authority, and in 1882 he received the title of director of the gallery. His publications comprise 'Recollections of Scenic Effects' (1839), the part on sculpture in Waring's 'Art Treasures of the United Kingdom' (1857). To his great knowledge and industry the National Portrait Gallery owes almost its whole value.

SCHARF, John Thomas, American historian: b. Baltimore, Md., 1 May 1843; d. there, 28 Feb. 1898. At the outbreak of the Civil War he entered the Confederate army, was engaged in the battles around Richmond, at Cedar Mountain, the second Battle of Bull Run and at Chancellorsville, and in 1863 became a midshipman in the Confederate navy. He participated in the capture of the *Underwriter,* near New Berne, N. C., and after the blockade was established he again joined the army. While on his way to Canada with dispatches he was captured. In 1874 he was admitted to the bar, was a member of the legislature in 1878 and in 1884 he was appointed commissioner of the land office of Maryland. He was editor of the Baltimore *Telegram* and of the *Morning Herald* and wrote 'Chronicles of Baltimore' (1874); 'History of Maryland' (3 vols., 1879); 'History of the Confederate States Navy' (1887); 'Natural and Industrial Resources and Advantages of Maryland' (1885–90), etc.

SCHARNHORST, shärn'hŏrst, **Gerhard Johann David von,** Prussian general: b. Bordenau, Germany, 12 Nov. 1755; d. Prague, 28 June 1813. He entered the Hanoverian army in 1780 and soon distinguished himself as an officer of artillery. In 1804 he was knighted by the king of Prussia, and in 1813 attained the rank of general in the Prussian army. In the reorganization of the army of Prussia in 1809–13 he proved himself an able general. The national spirit, awakened by the loss of the territories west of the Elbe, was greatly augmented by the genius of Scharnhorst, who infused the military spirit throughout the scattered populations of the Prussian domain by raising a large and well-disciplined volunteer army for the War of Liberation. In this campaign he was chief of staff under Blücher, but was mortally wounded at the battle of Lützen. Consult 'Life by Lehmann (1886–87); von Boyen, 'Erinnerungen' (1891).

SCHAUMBURG-LIPPE, shoum'bo͝ork-lĭp'ĕ former *Land* (state) in northwest Germany, merged in 1945 into the new *Land* of Lower Saxony in the British zone of occupation. At the time of its dissolution it had an area of 131 square miles; the population in 1939 was 54,162; the capital was Bückeburg. The region includes agricultural and mining districts. Philip, youngest son of Count Simon VI of Lippe (1555–1613), inherited little of the paternal estate but in 1640 fell heir to a large part of the countship of Schaumburg, including Bückeburg. He thus became the first count of Schaumburg-Lippe. In 1807 the county was erected into a principality and its rulers became sovereign princes. With Germany's collapse in 1918 the reigning prince abdicated and the principality declared itself a republic, adopting a constitution in 1922. It continued to exist as a *Land* of the German Republic until 1945.

SCHECHTER, shĕk'tĕr, **Solomon,** Hebrew scholar and theologian: b. Focşani, Rumania, 1847; d. New York, N. Y., Nov. 19, 1915. A student of Hebrew from his earliest years, he lectured on the Talmud at Jews' College, London, was appointed reader in Talmud and rabbinical literature at University College, Cambridge, England (1890), and professor of Hebrew at the University of London (1899). While traveling in Egypt he discovered a store of Hebrew and Arabic manuscripts, known as the Genizah fragments. Among them were lost portions of Ecclesiasticus, which Schechter published as *The Wisdom of Ben Sira* (1899). A leader of the Conservative wing of Judaism, he opposed the Reform movement, and as a Zionist believed that Zionism should be a movement religious in nature and not merely nationalistic. In 1901 he was invited to the United States to become president of the Jewish Theological Seminary in New York City. There he worked to strengthen Judaism, wrote many essays and books, was an editor of the *Jewish Encyclopedia,* and a supervisor of the translation of the Hebrew Bible into English (pub. 1917).

SCHEELE, shā'lĕ, **Karl Wilhelm,** Swedish chemist: b. Stralsund, then in Sweden, Dec. 19, 1742; d. Köping, May 21, 1786. Scheele worked as a pharmacist in Göteborg, Uppsala, and elsewhere, and in 1770 became a teacher of chemistry at Uppsala; but in 1775 he moved to Köping—to carry on his research in his own pharmacy for the rest of his life. His discovery of oxygen predated that of Joseph Priestley (q.v.), though his findings were published after Priestley's. He discovered many new substances, among them hydrogen sulphide, the salts of manganese, chlorine, baryta, glycerin, and numerous acids, including uric and lactic acid. The coloring matter he discovered in arsenic was named Scheele's green, and the mineral scheelite was named for him. See also Air; Oxygen.

SCHEELITE, shēl'īt, native calcium tungstate, $CaWO_4$. Molybdenum may partially replace tungsten (wolfram). It crystallizes in the tetragonal system, and frequently shows third order bipyramids. The specific gravity is 5.9–6.1, the hardness 4.5–5, and the luster is vitreous to adamantine. Pyramidal cleavage may be conspicuous. The color and streak are white when it is pure, but it may be brown, yellow, green, or red. It usually is fluorescent. Scheelite occurs in hydrothermal quartz veins, in contact metamorphic deposits, and in pegmatites. Associates are quartz, topaz, fluorite, cassiterite, molybdenite and wolframite. It is a minor source of tungsten. Found in Nevada, Arizona, California, Connecticut, British Columbia, Saxony, Bohemia, Brazil, and New South Wales, it was named for the Swedish chemist Karl Wilhelm Scheele (q.v.).

SCHEER, shār, **Reinhard,** German naval commander: b. Obernkirchen, Hesse-Nassau, Germany, Sept. 30, 1863; d. Marktredwitz, Bavaria, Nov. 26, 1928. A career in the German Royal Navy led to a command of the high seas fleet in 1909, promotion to admiral as department director of the navy in 1912, and, at the opening of World War I (1914), to command of the second battle squadron. He was famed for his submarine tactics. In 1916 he was made head of the high seas fleet and was in command at the Battle of Jutland (q.v), May 31, 1916. He was chief of the admiralty staff, and after the war retired to become a member of the Nationalist Party. He wrote two books on the German Navy in the war: *Germany's High Sea Fleet in the World War* (1920) and *From Sailing Ship to U-Boat* (1925). See also War, European—*11. Naval Operations.*

SCHEFF, shĕf, **Fritzi,** Austrian-American actress and singer: b. Vienna, Austria, Aug. 30, 1879; d. New York, N. Y., April 8, 1954. Appearing first in Munich (1898) as Marie in Gaetano Donizetti's *Daughter of the Regiment,* Fritzi Scheff made her American debut at the New York Metropolitan Opera House in 1900 as Marcelline in Ludwig von Beethoven's *Fidelio.* Later, abandoning a successful career in grand opera, she won a wider and more spectacular popularity in the operettas of Victor Herbert, which perfectly suited her charming, exotic personality.

SCHEFFEL, shĕf'ĕl, **Josef Victor von,** German poet and novelist: b. Karlsruhe, Germany, Feb. 16, 1826; d. there, April 9, 1886. Educated at Munich, Heidelberg, and Berlin, he entered state service at Säckingen (1850). His epic poem *Der Trompeter von Säckingen* (1853; Eng. tr. 1877) achieved immediate popularity and went into several hundred editions. His historical novel *Ekkehard* (1857; Eng. tr. 1867) was as well received.

SCHEFFER, shĕ-fâr', **Ary,** Dutch-born French painter: b. Dordrecht, Holland, Feb. 10, 1795; d. Argenteuil, near Paris, France, June 15, 1858. Scheffer was a pupil in Pierre Guerin's studio in Paris, where he met the young romantics with whom he is associated but was not in complete sympathy. Dante inspired such pictures as *Francesca da Ramini* (1822). Those inspired by Goethe were shown at the Paris Salon (1831) and though sentimental became very popular. Lord Byron and Johann von Schiller supplied other romantic subjects. Scheffer painted portraits, and historical and religious subjects. He also produced lithographs and etchings. Admired in France in his day, and represented in the Luxembourg, in the Wallace Collection, London, and at Versailles, he is not now considered to be of the first rank.

SCHEIDEMANN, shī'dĕ-män, **Philipp,** German Socialist leader: b. Cassel, 26 July 1865; d. Copenhagen, Denmark, 29 Nov. 1939. He joined the Socialist party at an early age, and became editor of the party paper in Giessen. Soon afterward he was elected a Socialist member of the Reichstag. In 1913 he toured the United States, lecturing before many German-speaking branches of the Socialist party. In August 1914 he began rallying the Socialist-Democrats to the support of the Imperial government, having already defended Germany's declaration of war on France and Russia. As leader of the Majority Socialists, he supported the German war policies until July 1917, when he joined forces with Erzberger, a Centre Party leader, who foresaw the early collapse of Austria, and who advocated the finish of the war in a peace without annexations or indemnities. The internal revolution of November 1918 followed; and on 9 November, the date of the abdication of Kaiser Wilhelm II, Scheidemann resigned his position as Secretary of State without portfolio, and from the Parliament Building proclaimed the new German Republic. With Friedrich Ebert as Chancellor, and the Majority Socialists in power, the provisional government was soon able to subdue all counter-revolutionary movements. Scheidemann was elected president of the first Republic Ministry in February 1919, but resigned in June of the same year after refusing to sign the Versailles Treaty. He served as leader of the Majority Socialists in the Assembly and Reichstag, however, until the advent of the Hitler régime, when he fled to Czechoslovakia. From there he went to Poland, and then to Denmark in 1934, where he remained until his death.

SCHEINER, shī'nēr, **Christolph,** German astronomer: b. at Waldt in Swabia, about 1575; d. 1650. Scheiner was professor of Hebrew and mathematics at Freiburg and at Ingolstadt from 1610–16, and after several years' residence in Rome he became rector of the Jesuit College at Neisse in Silesia. In 1612 he published his 'Tres Epistolæ ad Marcum Velserum' and claimed to have seen sun spots as early as March 1611. He thus antagonized Galileo whom he further provoked by upholding the old thesis of a «stable» earth and a «mobile» sun. 'Rosa Ursina' (1630) was his great work on the sun and contained the results of about 2,000 observations.

SCHELDT, skĕlt, or **SCHELDE,** shĕl'dĕ (ancient SCALDIS), a river belonging in the various parts of its course to France, Belgium and the Netherlands. It rises in the French department of Aisne, at a height of 295 feet above sea-level, in the small lake of Beaurevoir, near Catelet. It flows northerly to Cambrai, Valenciennes, Boudain and Condé, where it first becomes navigable after junction with the Saint Quentin Canal. It enters Belgium between Montagne and Hollain, passes Doornik, Oudenarde, Ghent, Dendermonde, Rupelmonde, Tournai and Antwerp; at Ghent is joined by the Lys and the canals which connect that city with Sas and Bruges. There is considerable tide at Ghent, somewhat modified by sluices. The river makes a great bend toward Dendermonde and Antwerp, flows circuitously north forming the boundary between Antwerp and East Flanders provinces. At Antwerp it measures 1,600 feet in width, 45 feet in depth and still wider below, forms a secure harbor, which is capable of receiving the largest ships. Again turning northward, it is finally lost in the estuaries among the islands of Zealand. After reaching the Dutch frontier it divides into the East and West Scheldt, the latter and main stream flowing into the North Sea, below Flushing. Both branches connect with the Meuse and the Rhine. The entire length of the river is 211 miles. Its principal affluents are the Haine Dender, the Rupel, the Sensée, Scarpe and Lys. In 1925 the Dutch and Belgian governments reached an agreement by the terms of which the Scheldt is to be open to warships in time of peace, but closed in time of war. This question has been a source of irritation since the treaty of 1839. A commission exercises control over the river and the Terneuzen Canal.

SCHELLING, shĕl'lĭng, **Felix Emanuel,** American educator: b. New Albany, Ind., Sept. 3, 1858; d. Mount Vernon, N.Y., Dec. 15, 1945. In 1881 he was graduated at the University of Pennsylvania, where he received the degree of LL.B. in 1883, that of A.M. in 1884, Litt.D. in 1903 and LL.D. in 1909. In 1893 he became John Welsh Centennial professor of English literature at the University of Pennsylvania. Dr. Schelling was a member of the National Institute of Arts and Letters, of the American Philosophical Society, and of the Modern Language Association of America. He published *Literary and Verse Criticism of the Reign of Elizabeth* (1891); *Life and Works of George Gascoigne* (1893); *A Book of Elizabethan Lyrics* (1896); *A Book of 17th Century Lyrics* (1899); *The English Chronicle Play* (1902); *The Queen's Progress and Other Elizabethan Sketches* (1904); *History of Elizabethan Drama* (1908); *English Literature During the Lifetime of Shakespeare* (1910); "The Restoration Drama" in *Cambridge History of Literature* (1912); *The English Lyric* (1913); *A History of English Drama* (1914). He edited *Ben Jonson's Discoveries* (1892); *Eastward Ho and the Alchemist* (1903); *Macbeth* (1910); and *Beaumont and Fletcher* (1912).

SCHELLING, Friedrich Wilhelm Joseph von, German philosopher: b. Leonberg, in Württemberg, 27 Jan. 1775; d. Ragaz, Switzerland, 20 Aug. 1854. He studied theology and philosophy at Tübingen and natural science at Leipzig. His philosophy of nature as presented in 'Ideen zu einer Philosophie der Natur' (1797) and in 'Von der Weltseele' (1798), gained for him an appointment as professor at the University of Jena (1798). There he became the leading philosopher of the «early romanticists» and was highly esteemed by Goethe. In 1803 he married Caroline, the former wife of A. W. Schlegel (q.v.), and accepted a professorship in Würzburg. From 1806 to 1820 he lived in Munich as a member of the Academy of Science and also (since 1809) as general secretary of the Academy of Arts. He resumed his academic work from 1820 to 1827 at Erlangen, and from 1827 to 1841 at Munich. The theosophical turn of his later works induced Frederick William IV of Prussia to call him to the University of Berlin (in 1841), as a counterweight against the radi-

cal left wing of Hegel's disciples. But his lectures on mythology and revelation met with scant success and he retired in 1846. Among the ever-changing phases of his philosophical evolution two main periods may be distinguished; the first, which found its consummation in his "system of identity," is pantheistic in its general character; in the second period, beginning about 1806, he elaborates his "positive" philosophy, which rests on a theistic and theosophical basis.

Schelling had originally started as a disciple of Fichte's "Philosophy of the Ego," but his study of Spinoza and his own love of nature soon induced him to attempt a vindication of the external world, which Fichte had degraded by defining it as the mere "Not-self." In Schelling's Philosophy of Nature the external world is the preliminary stage (Vorstufe) of the Spirit. Nature is the unconscious side of the "Absolute" or "Infinite," just as the Spirit is its conscious side. Like Fichte, he conceives the "Absolute" as a process, as an activity (not as a substance) which continuously ascends from lower to higher forms of development. In carrying out this scheme he made use of many of the new ideas and discoveries that were then revolutionizing the natural sciences. Polarity (as exhibited in the two poles of a magnet) appears to him as the principle of all phenomena of nature. Everywhere, he sees dualism and polarity: positive and negative factors which neutralize each other, leading up to and producing a new reality. By means of repeated steps from lower to higher potencies the "Soul of Nature" (Weltseele) unfolds itself. The primal dualism of expansion ("imponderable matter," ether) and contraction ("ponderable matter," gravity) reveals itself more distinctly in the magnetic, electrical and chemical phenomena of the inorganic world, and in the corresponding functions of reproduction, irritability and sensibility of living organisms.

In the phenomena of sensibility the external order of things reaches its culminating point. But the same processes of polarity and evolution appear again on a different plane in the inner world of conscious existence. In his 'System of Transcendental Idealism' (1800; extracts translated in Prof. Benj. Rand's 'Modern Classical Philosophers,' 1908) Schelling represented the "Epochs of Self-consciousness" as parallel to the successive stages in the development of nature. Finally, the objective and subjective side of ourself (or the theoretical and the practical attitude of the mind, or intellect and activity) are carried to their harmonious union in the world of art and poetry. In art the human mind achieves the actual synthesis of the conscious and the unconscious. Art is the organ of the true philosopher; his highest aim must be a new mythology, which is to unite philosophy and poetry in objective representation.

The first period of his philosophy found its final expression in his "system of identity," as set forth in the 'Darstellung meines Systems' (1801), in the platonic dialogue 'Bruno' (1802) and in the 'Methode des akademischen Studiums' (1803). Merely comprehended by the analytical and formal faculty of the intellect, the universe divides itself into the two great regions variously denominated as Nature and Self, Matter and Spirit, Real and Ideal. But the connecting faculty of reason or "intellektuale Anschauung" (intellectual sight or perception, which is akin to the "intuition" of artistic genius) shows the antithesis of the two regions as only relative. Both are originally and essentially One; they are only two different forms of manifestation of the One Infinite. The Infinite or Absolute is the eternal Identity of the Real and the Ideal, which are the two poles of the Absolute. The process of the Universe consists in the splitting up of the original "absolute Indifference" into the opposites that were latent in it, and in the striving for a reunion of the "differences" in an ultimate absolute Identity. This active process of the Absolute, ascending from "indifference" through polar differentiation toward "identity," is also conceived by Schelling, in this period, as identical with the evolution of God.

After 1806, Schelling gradually became convinced that this rationalistic pantheism, which he now stigmatized as "negative," must find its counterpart and consummation in a "positive" system. The "thread of dialectical movement may be sufficient as a guide through the world of the purely rational but it breaks as soon as it takes the weighty step into reality," into the world of empirical specification. Here the contingent must be added to the necessary, and rational knowledge must be supplemented by irrational, but definite, experience of a higher order, which acquires the character of "Revelation." The creation of the World is now the free act of a supernatural and personal God; the actual or contingent world has come into existence by a mystical falling away from the original identity in which it lived in the bosom of the Absolute and Divine Being. Schelling's 'Essence of Human Freedom' (1809) shows clearly the influence of Jacob Böhme's theosophy. His 'Philosophy of Mythology and of Revelation,' published after his death, consists of mystical speculations about pagan mythology and Christian doctrines. He distinguishes a Petrine and a Pauline Christianity which are represented in the Catholic and Protestant churches. Both are dominated by the Johannine theology which is the highest form of Christianity.

As an eclectic of the highest order, Schelling assimilated and welded into an imposing synthesis such divergent types of human thinking as Kant, Spinoza, Leibniz, Fichte, Plato, Bruno, Böhme, Plotinus and the Gnostics. His philosophy of nature alone gained an immediate and powerful influence, not only in Germany, where Goethe, the romanticists and most of the scientists considered him as their philosophical spokesman, but in the rest of Europe also through disciples like Coleridge and V. Cousin. His conception of one continuous process of evolution which would embrace in successive steps the lifeless and the living world, was a great philosophical anticipation and did much to promote a scientific study of nature. But his method of reasoning by suggestive analogies and, in general, the artistic turn of his mind brought him into discredit among the younger school of exact scientists. For a time it was customary to deride him as the founder of "speculative physics." But many of his leading

ideas have since been vindicated before the scientific world.

TRAUGOTT BOHME.

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SCHENCK, Robert Cumming, American diplomat: b. Franklin, Ohio, Oct. 7, 1809; d. Washington, D.C., March 23, 1890. He was graduated at Miami University in 1827, and remained there as tutor until 1830. In that year he became a student of law in the office of the Hon. Thomas Corwin at Lebanon, Ohio, and was admitted to the bar in 1831. He began the practice of law at Dayton, Ohio, and soon achieved marked success in his profession.

In 1840, during President Harrison's "Log Cabin" campaign, he was elected to the legislature of Ohio, and entered upon his political career. He soon became a leader in the Whig Party, and was recognized throughout his section as an able and effective public speaker. In 1843, after an exciting political contest, he was elected to his first term in Congress, retaining his seat until 1851, and becoming one of the most prominent leaders of his party at Washington. In 1851 he was appointed United States minister to Brazil, where he remained some years, and performed important diplomatic service.

When the Civil War began he promptly offered his services to the government, and received a commission of brigadier general of volunteers. He was severely wounded at the second battle of Bull Run, and his right hand and arm permanently disabled. He was later promoted to the rank of major general, and served in the army until December 1863, when he resigned his commission to accept a seat in Congress, to which he had been elected in the fall of 1862 over Clement L. Vallandigham (q.v.). General Schenck's military and political abilities were at once recognized and he was appointed chairman of the Military Committee of the House and rendered important and arduous services. He was three times elected to Congress. He served as chairman of the Committee on Ways and Means and became the leader of his party in the House. On Dec. 22, 1870 he was appointed minister to Great Britain by President Grant, a position which he filled with distinction until 1876. During this term of service he was appointed member of the historic Joint High Commission which assembled at Washington, and provided by treaty for the Geneva Conference, a measure that resulted in substituting arbitration instead of war in the settlement of the serious controversies that had arisen between Great Britain and the United States, regarding the Alabama claims and other important subjects. His tact and force, and his knowledge of international law, were most useful in determining the great questions involved.

SCHENCK, William Edward, American clergyman: b. Princeton, N. J., March 29, 1819; d. Oakenout, Pa., Dec. 14, 1903. He was graduated from Princeton in 1838, from the theological seminary there in 1841 and was ordained in 1843. He was engaged in pastoral work in New Jersey and New York until 1852, was secretary of the Presbyterian Board of Publication in 1854–1886 and its editor in 1862–1870, and from 1865 was a director of Princeton Theological Seminary. He published *Historical Account of the First Presbyterian Church of Princeton, N. J.* (1851); *Church Extension for Cities* (1854); *Nearing Home* (1863); *The Fountain for Sin* (1864); *Children in Heaven* (1867), etc.

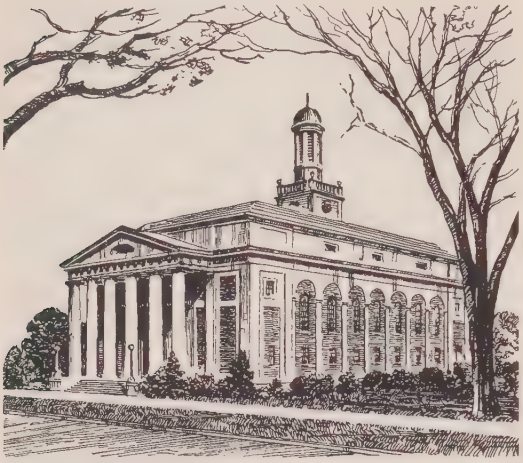
SCHENECTADY, city, New York, county seat of Schenectady County, altitude 211 to 275 feet; on the Mohawk River, new Barge Canal and on the New York Central Railroad and the Delaware and Hudson Railroad, about 15 miles northwest of Albany. It has connection with the Boston and Maine Railroad at Scotia and with the West Shore Railroad at South Schenectady. Local bus lines connect the city with Albany, Troy, Gloversville, Saratoga Springs, and other nearby places. Schenectady County airport is located ten minutes from the center of the city.

Buildings and Municipal Improvements.—The principal buildings are the post office, city hall, county courthouse, new state armory, the Young Men's Christian Association, the Young Women's Christian Association, the Schenectady County Tuberculosis Hospital, the City Hospital, Ellis Hospital, St. Clare's Hospital and Eastern New York Orthopedic Hospital. There are 96 churches, representing ten denominations. Union College has a beautiful Memorial Chapel.

Manufacturing.—Schenectady has a wide variety of industries, producing a labor supply that has become diversified. The General Electric Company has here its general offices and largest works which is the largest of its kind in the world and is also the largest industrial establishment in New York state. The American Locomotive Company also has its principal plant and main office in this city. Here also is located one of the oldest and best known radio stations, WGY, the famous short wave station, WGEO, the television station WRGB; frequency modulated stations WGFM and WBCA and local station WSNY. In addition to industries already mentioned there are manufacturers of mica insulators, printing and bookbinding establishments, ice cream and dairy products plants, baseballs, gloves, varnishes and paints, bedding, building materials and supplies, plating works, lithographing, confectionery, cabinet works, etc. The Schenectady General Depot of the U.S. Army is located at South Schenectady and the U.S. Naval Supply Depot in Scotia.

Education.—Higher education is served by Union College, one of the oldest in the country, being founded in 1795. In addition, the public school system consists of three high schools, three junior highs; two combined junior and elementary

and 19 elementary schools. Also there are six parochial schools and two private schools. Of interest to historians and antiquarians are the Schenectady County Historical Society's building and the new Schenectady Museum. Many scientists of national repute are engaged in the General Electric laboratories here.



Memorial Chapel, Union College, Schenectady, New York.

Government.—In 1906 Schenectady discarded its third-class city charter and became a second-class city. On Jan. 1, 1936, the city-manager-council form of government went into effect. The council of seven members, including the mayor, is nominated and elected at large. The term of office is four years, with three councilmen elected every two years and the mayor every four years. The city manager, the administrative head who serves at the council's pleasure, is appointed by the city council.

History.—Schenectady was settled in 1661 by Arent Van Curler, and letters patent were granted in 1684. On Feb. 8, 1690, the place was attacked by a force of French and Indians, who massacred all but 60 of the inhabitants and burned the town. In 1765 it was incorporated as a borough and in 1798 chartered as a city. Among the early steam railroads in the United States was one from Albany to Schenectady. The water communication by means of the Mohawk, increased by the new Barge Canal and the railroad communication at an early date, all contributed toward making the city a commercial and industrial center. It has increased steadily in population and industries. Pop. (1880) 13,655; (1890) 19,902; (1900) 31,682; (1910) 72,826; (1920) 88,723; (1930) 95,692; (1940) 87,549; (1950) 92,061.

SCHENK, Leopold, Austrian embryologist: b. Urmeny, Hungary, Aug. 23, 1840; d. Schwanberg, Styria, Austria, Aug. 17, 1902. He was graduated at Vienna University in 1865 and was appointed assistant professor of embryology there in 1873. He attained worldwide notoriety, and the censure of the medical profession generally, for his theories concerning sex control of the embryo through the diet of the mother. He also worked the theory into an elaborate plan for control of the development of the race. He was eventually forced to resign his position in the university. He wrote several textbooks and *Einfluss auf das Geschlechtsverhältniss des Menchen und der Thiere,* Eng. tr., *The Determination of Sex* (1898).

SCHERER, shā-râr', **Edmond,** French journalist: b. Paris, France, April 8, 1815; d. Versailles, France, March, 16, 1889. He studied at the law faculty of Paris, took a course in theology at Strasbourg, entered the Protestant ministry in 1840 and in 1845 became professor of exegesis in the École Evangelique, Geneva, popularly known as L'Oratoire. This he resigned in 1849 and became leader in the liberal movement in Protestant theology. He was elected to the National Assembly from Seine-et-Oise in 1871, and became a life senator in 1875. In both chambers he was a prominent representative of the left center.

He was made chief literary critic of *Le Temps* in 1860, later its editor. He took rank as a brilliant though opinionated critic, his reputation in this field having been made by a series of articles on important thinkers and writers of other literatures in the *Revue des Deux Mondes.*

SCHERESCHEWSKY, skĕr-ĕs-kūs'ki **Samuel Isaac Joseph,** American Protestant Episcopal bishop: b. Tanroggen, Lithuania, Russia, May 6, 1831; d. Tokyo, Japan, June 9, 1906. He studied in Russia and Germany, and, after coming in 1854 to the United States, at the Western Theological Seminary (Allegheny, Pa.) and the General Theological Seminary; was ordained deacon of the Protestant Episcopal Church in 1859, priest in 1860 and was a missionary in China in 1860–1875. In 1877 he was consecrated third Protestant Episcopal bishop of China, but he resigned his office in 1883 and afterward resided in the United States, China, and Japan. With J. S. Burden he translated the Book of Common Prayer into Mandarin, and he also prepared a complete revision of the Mandarin Bible (1895) and a wholly new rendering of the Bible into Wenli, the classical language of China (1902).

SCHERMAN, shûr'măn, **Harry,** Canadian-American writer: b. Montreal, Canada, Feb. 1, 1887. He was educated in the Philadelphia public schools and at the Wharton School of Finance, and Law School, University of Pennsylvania. He was one of the organizers of the Little Leather Library Corporation (1916) publishers of ten cent classics. He originated the Book-of-the-Month Club in 1926 and was its president until 1950 when he became chairman of the board.

He is the author of *The Promises Men Live By: a New Approach to Economics* (1931); *The Real Danger in our Gold* (1940); *The Last Best Hope on Earth* (1942).

SCHERR, shĕr, **Johannes,** German literary historian: b. Hohenrechberg, near Gmünd, Oct. 3, 1817; d. Zürich, Switzerland, Nov. 21, 1886. He was educated at the University of Tübingen, from which he received his doctorate in 1840, and subsequently settled in Stuttgart, where he became a teacher. As a leader of the Democratic Party, he took a prominent part in the revolution of 1848, and in the following year he was forced to flee to Zürich. Appointed professor of history and literature at the Polytechnikum there in 1860, he held this position until his death. Besides a four-volume satirical novel, *Michel: Geschichte eines Deutschen unserer Zeit* (1858), his published works include *Allgemeine Geschichte der Literatur* (1851); *Deutsche Kultur- und Sittengeschichte*

(1852–1853); *Geschichte der Religion* (1855–1857); *Schiller und seine Zeit* (1859); *Kulturgeschichte der deutschen Frau* (1860); and *Blücher, seine Zeit und sein Leben* (1862–1863).

SCHERZO, skĕr'tsō (Italian: a jest), a term applied to a movement in a symphonic composition having a playful, humorous, or capricious character. It may be said to have developed from the Joseph Haydn minuet and trio—in which form it is generally written—although the term was used before his time. Beethoven found in it a congenial channel of expression for his boisterous sense of humor, and in his hands it attained a recognized importance. Later composers have also written scherzos, though often their character is light and graceful rather than humorous. The term is occasionally given to an independent composition such as Chopin's scherzos for the piano.

SCHEVENINGEN, sĸā'vĕ-nĭng-ĕ(n), town, Netherlands, situated in South Holland Province, on the North Sea, 2 miles west of The Hague. A popular resort, the town also has herring fisheries and canneries. It suffered considerable damage during World War II, but reconstruction was rapid after the war. There are a number of parks, extensive woods, a boulevard along the ocean, and the Kurhaus, where concerts, recitals, and plays are given. Scheveningen is part of the commune of The Hague.

SCHIAPARELLI, skyä-pä-rĕl'lê, **Giovanni Virginio**, Italian astronomer: b. Savigliano, March 14, 1835; d. Milan, July 4, 1910. He was graduated from the University of Turin in 1854, and subsequently studied at Berlin under Johann Franz Encke, and at Pulkovo, Russia, under Friedrich Georg Wilhelm von Struve. Returning to Italy in 1860, he was appointed assistant observer at the Brera Observatory in Milan, and two years later became its director, a position he held until his retirement in 1900. In 1861 he discovered the asteroid Hesperia. He also observed numerous double stars, and he showed the relation between meteor swarms and cometary orbits. In 1877 he published the first accounts of his observations of what he called the canals of Mars. Schiaparelli was the author of many works on various phases of astronomy, including *Le stelle cadenti* (1873); *Norme per le osservazioni delle stelle cadenti dei bolidi* (1896); *L'astronomia nell' antico Testamento* (1903); and *Elementi di astronomia sferica* (1912).

SCHIAVONE, skyä-vō'nā, **Andrea** (real name Andrea Medolla or Meldolla), Italian painter: b. Dalmatia, 1522?; d. Venice, 1582. He was a pupil of Titian and became one of the finest colorists of the Venetian school. Among his works are *Christ Before Pilate* (Venice Academy); *Adoration of the Magi* (Ambrosiana, Milan); *Flight to Emmaus* (San Sebastiano, Venice); two landscapes (Berlin); *Holy Family* (Dresden); and *Christ Before Caiaphas* (Vienna).

SCHICK, shĭk, **Béla**, American pediatrician: b. Boglár, Hungary, July 16, 1877. He received his M.D. degree from Karl Franz University in Graz in 1900, and two years later began practicing medicine in Vienna. He was affiliated with the University of Vienna from 1902 to 1923, and from 1918 to 1923 was professor of pediatrics there. He went to the United States in 1923 and became an American citizen in 1929. Schick served as a consultant at the New York Infirmary for Women and Children and Mount Sinai, Sea View, Willard Parker, and Beth Israel hospitals in New York City, and from 1936 to 1943 was clinical professor of children's diseases at Columbia University. He is best known as the discoverer of the Schick test for determining susceptibility to diphtheria (1913). His published works include *Serum Krankheit* (with Clemens Pirquet, 1905); *Pirquetsche System der Ernährung* (1918); *Child Care Today* (with William Rosenson, 1933); and articles on diphtheria, scarlet fever, tuberculosis, and nutrition. In 1938 he was awarded a gold medal by the New York Academy of Medicine.

SCHIEDAM, sĸê-däm', town, Netherlands, situated in South Holland Province, near the confluence of the Schie and Nieuwe Maas rivers, 3.5 miles west of Rotterdam. Its principal industry is the distilling of gin. It also has shipyards and plants producing glass, bottles, chemicals, machinery, asbestos, cardboard, and crates. The town is intersected by numerous canals. Notable buildings include a 17th century town hall and the 15th century Great or St. Jans Church.

Schiedam was chartered in 1273 and developed as a fishing port until it was superseded by Rotterdam. Pop. (1951) 73,603.

SCHIFF, shĭf, **Jacob Henry**, American banker: b. Frankfurt am Main, Germany, Jan. 10, 1847; d. New York, N. Y., Sept. 25, 1920. He went to the United States in 1865 and joined a brokerage house in New York City. In 1870 he became an American citizen, and five years later was made a partner of the firm of Kuhn, Loeb & Company, of which he became the head in 1885. Schiff's leadership in the financial field was soon acknowledged. He participated in the financing of a number of railroads and insurance companies and in the marketing of foreign bonds, notably a Japanese issue in 1904 and a Chinese loan in 1911. He was also a generous benefactor of educational and charitable institutions, including Harvard University, where he endowed the Semitic Museum; the Jewish Theological Seminary, New York City; Tuskegee Institute; Cornell University, where he endowed a chair for the study of German culture; Barnard College; the American Red Cross; Montefiore Hospital, which he served as president; and the Boy Scouts of America.

SCHILLER, shĭl'ẽr, **Ferdinand Canning Scott**, English philosopher: b. Ottensen, near Altona (now part of Hamburg), Germany, Aug. 16, 1864; d. Los Angeles, Calif., Aug. 6, 1937. He was educated at Rugby and at Balliol College, Oxford. From 1893 to 1897 he was an instructor at Cornell University; from 1897 to 1903 assistant tutor at Corpus Christi College, Oxford; from 1903 to 1926 tutor there; and from 1929 to 1936 professor of philosophy at the University of Southern California. Schiller is best known as the leading English exponent of pragmatism, which he discussed under the term humanism. His published works include *Riddles of the Sphinx* (1891); *Humanism* (1903); *Studies in Humanism* (1907); *Plato or Protagoras?* (1908); *Formal Logic, a Scientific and Social Problem* (1912); *Problems of Belief* (1924); *Eugenics and Politics* (1926); *Cassandra, or the Future of the British Empire* (1926); *Social Decay and Eugenical Reform* (1932); and *Must Philosophers Disagree?* (1934).

SCHILLER, Johann Christoph Friedrich (von), German dramatist, poet, historian and philosophic thinker: b. Marbach in Swabia, 10 Nov. 1759; d. Weimar, 9 May 1805. His father was an officer in the army of the Duke of Württemberg, his mother a pious housewife nowise distinguished above her kind. The parents early decided to fit their son for the priesthood in the Lutheran Church. To this end they sent him to the Latin school at Ludwigsburg, which was then the ducal residence. Duke Karl Eugen was conspicuous among the German princelings who aped the style of the Bourbon kings, Ludwigsburg being his Versailles. Here he maintained a costly opera, spent large sums on building projects and governed through mistresses and adventurers. The boy Schiller had thus a good opportunity to observe the ways of petty autocracy under the old régime, and he used his eyes to good advantage. Presently the duke experienced a change of heart, became an exponent of virtue and went in for works of benevolence. In this spirit he founded a military academy which was to train the sons of his officers for the public service. That he might have the boys under his own eye and mold them to his liking, he assembled them under his own roof in his castle "Solitude," where for a time he played the schoolmaster with them. His offer of a scholarship to the boy Schiller was a princely favor not to be rejected by the loyal parents, though it involved giving up their plan of making him a pastor. To this school the lad went in 1773 and started in as a student of law, but floundered badly at first. After two years the school was transferred to Stuttgart, where it became virtually a university minus the theological faculty. A medical faculty was now added, and to secure students certain *élèves* (French was the official language of the school) were allowed to go over to medicine. Schiller, who had been at the foot of his class, eagerly accepted this chance. From this time (1775) on he devoted himself with average assiduity and success to medical studies. In 1780 he was honorably dismissed, but without a doctor's degree.

The discipline of the school was severely military. The students were kept under constant surveillance, their reading was censored and their quarters often searched for contraband books. But they found ways to smuggle in the forbidden literature, which of course tasted the sweeter for the prohibition. It is certain that young Schiller read nearly all the revolutionary productions — works of the so-called "storm and stress," — that were just then coming out. They soon raised his incipient radicalism to the boiling-point. A friend called his attention to a magazine story by Schubart dealing with a pair of enemy brothers, a theme just then in favor with the literary radicals. The hint was enough. Schiller, who by this time felt sure that the writing of tragedy was to be his vocation, began to pen his 'Robbers,' in which a dissolute but soft-hearted young nobleman named Karl von Moor, while leading a wild life as a Leipzig student, receives a harsh letter from his dotard father telling him that he is disinherited. Driven to fury by the missive and not suspecting the machinations of his scoundrel brother, Franz, he puts himself at the head of a band of scapegrace students and leads them to the Bohemian Forest, where they become outlaws and run amuck against society. Moor robs and murders on a terrific scale, yet not for vulgar gain. He tries to correct the inequalities and injustices of the social order, imagining that he is doing a righteous work as the avenger of the poor and oppressed, and fully believing that God is on his side. When he learns the truth he gives himself up to the law which he has outraged. Thus the play is a tragedy of fanaticism, and as such it marks the emergence of a new dramatic type. It has glaring faults of extravagance and overemphasis, but is none the less the work of a born dramatist, all clearly visualized for action and powerfully bodied forth. It was chiefly the fame of this thunderous play that led, in the course of time, to Schiller's being made an honorary citizen of the first French republic. There is an authentic tradition that in reading the scenes of the nascent 'Robbers' to his spellbound fellow-students, he would sometimes snort and roar and stamp in the white heat of his indignation.

Toward the end of 1780 he left the academy and was made army doctor to a regiment of invalid soldiers stationed at Stuttgart. The service was disagreeable and poorly paid. To increase his pittance of an income he borrowed money and published the play he had written, letting it appear anonymously as a book for the reader. It made no great stir as mere literature, but caught the attention of Dalberg, director of a theatre at Mannheim, who suggested a revision for the stage. Schiller complied and the new version was played at Mannheim in 1781 with memorable success. The audience went wild over the performance and the obscure army doctor at once emerged into the glare of notoriety, though he had saddled himself with a debt which was destined to afflict him for years. After such a success he was naturally disposed to try again. He wrote a second play, on the abortive conspiracy of Fiesco at Genoa in 1547, conceiving it at first rather vaguely as a "republican tragedy." Meanwhile he had got into serious trouble with his lord and master, the duke. In the first place, he had left his post without permission in order to attend the first performance of the 'Robbers' at Mannheim. Secondly, a passage in the published play had given offense in Switzerland and led to public complaints. The result was that Schiller was given two weeks in the guardhouse and forbidden to write any more "comedies." This was too much. He decided to quit Württemberg. One evening in September 1782 he stole away clandestinely with a friend named Streicher, a musician who afterward published an account of the episode. Under assumed names the pair went first to Mannheim, where Schiller read his new 'Fiesco' to Dalberg's actors and received the humiliating verdict that it was worthless and could not be played. He had ruined its effect by his bad reading, and besides that the politic Dalberg was in no haste to befriend a runaway who had quarreled with the ruler of a neighboring state. Schiller was now technically a deserter and had very good reason to fear that he would be pursued and put under arrest. So he took refuge at Bauerbach, near Meiningen, occupying a house that had

been put at his disposal by a friendly lady named Henriette von Wolzogen. At first he went under the name of Dr. Ritter and scattered misleading letters as to his whereabouts, but his friends soon learned where he was and it became evident that the Duke of Württemberg was taking no steps to have him arrested. Being now free for his favorite employment, he wrote a third play, which he at first called 'Luise Miller,' afterward 'Cabal and Love,' and sketched a fourth, which was to be known as 'Don Carlos.'

In the summer of 1783 he returned to Mannheim under a year's contract as theatre-poet, Dalberg having become convinced that there was no danger to be feared from Stuttgart and hoping that the new plays would repeat the huge success of the 'Robbers.' In due time 'Fiesco' was put on the stage with moderate success, but not as a "republican tragedy." By a stroke of the pen its author had given it a happy ending. Instead of being slain as a selfish usurper by the fanatical republican Verrina, Fiesco is made, in the moment of his triumph, to cast off his ducal robes and bid the Genoese embrace him as their happiest fellow-citizen. This ending clearly supports the republican idea, but we are hardly prepared for such a turn by the preceding trend of the play, which makes Fiesco continually vacillate between republican idealism and the lure of personal aggrandizement. 'Cabal and Love' is a tragedy of class-conflict and incidentally a drastic comment on the ways of German courts and courtiers. A high-minded nobleman falls in love with a fiddler's daughter and wishes to marry her in spite of her humble birth. But his father, who has risen by crime to the presidency of the ducal council, will have none of such a misalliance and concocts a vile plot to force his son into a marriage with the duke's mistress. This is the "cabal." The plotters succeed in making Ferdinand madly jealous, so that he poisons Luise and then commits suicide. In writing the play Schiller had the Württemberg court in mind, and little touches here and there reflect actual history. But the duke himself does not appear and there are no telltale names. 'Cabal and Love' has many strong scenes and is the only class-conflict play of that epoch which is still alive on the German stage. But its effect is marred at the last by the fatuous conduct of the tongue-tied heroine, who forfeits sympathy by her seeming lack of common sense.

The three plays just considered, all written in prose and characterized by a vehement, high-keyed diction, are the most important yet not the sole expression of Schiller's youthful radicalism. While still living in Stuttgart he started a magazine called the *Württemberg Repertory,* for which he wrote a number of minor papers. He also published a so-called *Anthology for the Year* 1782 containing numerous short poems. The dominant note of Schiller's early verse is a certain high-pitched vehemence which is apt to suggest poetic feigning. He is as far as possible from the simple realistic manner of the young Goethe, having a marked fondness for soaring and sonorous diction.

At the end of his first year in Mannheim the contract with Dalberg was not renewed, so that Schiller found himself in the summer of 1784 without income and without prospects. He was oppressed by debt and generally unhappy. Mannheim had become a prison. He decided to try his fortune by starting a dramatic magazine to be known as the *Rhenish Thalia,* but hardly had he launched it when he was called away from the Rhine country by a friendly message from Gottfried Körner, a young lawyer just then living in Leipzig. After a short sojourn in the university town Schiller followed his new-found friend to Dresden, where he remained nearly two years in intimate association with the Körner family. He continued to publish his magazine, now called simply *Thalia,* and at the same time worked in a desultory fashion on his 'Don Carlos.' This he had originally planned as a love-tragedy in a king's household, purposing incidentally to scourge the Spanish Inquisition. But the mood of the revolutionist and special pleader gradually gave way to the serener ambition of the poet and he decided to write his new play in verse, as Lessing had lately done in the case of 'Nathan.' In the illusory hope of receiving valuable criticism he began to publish it piecemeal in successive numbers of the *Thalia.* As he worked his mind changed, important characters began to appear in a new light and the centre of gravity shifted. The result was that the very long play completed in 1787 was something very different from the one he had conceived four years before. 'Don Carlos' is a tragedy of political idealism wrecked by a passion for intriguing methods and would-be heroic foolhardiness. The weightiest character is not the nominal hero, but the Marquis Posa, who pleads with Philip II of Spain to grant the Netherlanders freedom of thought and to end the Spanish régime of force and terrorism. Posa is a humane idealist of the 18th century and voices Schiller's own convictions as matured by his intercourse with Körner. Viewed in its relation to its author's personal development 'Don Carlos' occupies a middle position between the rather crude realism of his early prose plays and the matured art of his later and more famous poetic dramas. In 'Don Carlos' his peculiar sonorous diction begins to show itself at its best. But the play as a whole suffers from a lack of simplicity and clearness. It is too long and complicated for the three hours' traffic of the stage.

In the summer of 1787 having tired of his dependence on Körner, Schiller decided to try his fortune in Weimar, whose duke had previously given him the title of councillor. Goethe was then in Italy, but the visitor soon made the acquaintance of Herder and Wieland. Ere long he decided to settle in Jena and devote himself to the writing of history. He had now lost touch with the stage and his experience with it had been on the whole disappointing. On the other hand, he had become very much enamored of historical study, and his reading for 'Don Carlos' had given him a special interest in the great Dutch-Spanish conflict of the 16th century. He planned a bulky treatise of six volumes on the subject, but only wrote one. It was published in 1788 under the title 'Defection of the Netherlands.' The book is brilliantly written, the author's sympathies being obviously with the Dutch in their struggle for freedom, and contains a number

of splendid literary portraits. But Schiller got his information rather easily and made no very careful study of the sources. His merit as a historian has been often attacked and as often defended. At any rate he made literature out of history, the first achievement of that kind in the German language. His success as a historian led to his appointment, through Goethe's influence, to a professorship at the University of Jena. But hardly had he entered on his academic duties when a dangerous illness shattered his health. He never fully recovered, but led henceforth the circumspect life of a semi-invalid. A gift by the Duke of Augustenburg freed him temporarily from pecuniary anxieties — he was now married to the dowerless Charlotte von Lengefeld — and he resolved to devote his freedom to the study of Kant. He felt that critical thinking had largely destroyed his imaginative spontaneity and that the only possible cure lay in a further study of fundamentals: the «rules» must repair the damage they had wrought. So for several years he devoted himself about equally to history and philosophy, writing rather copiously in both fields. In the former we have his 'History of the Thirty Years' War,' which he conceived as a revolt of the Protestant princes of Germany against the centralizing despotism of the house of Hapsburg. It is eminently readable, especially where it treats of the great Swedish king who is Schiller's hero. He also wrote a number of minor historical papers. To enliven the columns of his *Thalia* he published in it his one attempt at prose fiction, the 'Ghostseer,' a fragmentary yarn which exploits various phases of contemporary interest in the supernatural. It is fair to call it a yarn because he himself never took it seriously and even called it a «Sudelei.» In general, this period of Schiller's life is rather barren of poetic production. To it belong, however, the 'Gods of Greece' and the 'Artists,' two of his weightiest and most famous poems. The former is an elegy on the lost beauty of Greek polytheism, the latter a glowing tribute to the influence of art in the upward evolution of human kind. In the philosophic domain Schiller devoted himself mainly to the theory of beauty and its relation, on the one hand to art, on the other to conduct. Setting out from Kant's analysis of beauty in the 'Critique of Practical Judgment,' Schiller reached the conclusion that beauty is fundamentally freedom-in-the-appearance. He set forth his doctrine and its implications in a number of rather forbiddingly abstruse essays, of which the most interesting one, perhaps, is that entitled 'Uber Anmut und Würde' ('On Winsomeness and Dignity'). In a more popular and readable form his philosophy of art is expounded in his 'Letters on Esthetic Education' and his famous essay on 'Naive and Sentimental Poetry.'

In 1794 began the famous friendship of Schiller and Goethe. For seven years the two men had lived as mutually indifferent neighbors, each acquainted with the other's work but neither caring for a closer relation. A casual meeting at a scientific lecture put an end to this mutual aloofness, explanations and visits ensued and ere long they were close friends and literary allies. Goethe became a frequent contributor to Schiller's magazine *Die Horen* and took a keen interest in its success. But it did not succeed and after three years was discontinued. It was largely their irritation over this failure that led the two men to unite in the literary campaign of the 'Xenia,' a collection of epigrams in the ancient distich form, wherein they paid their respects to men and tendencies they did not like. Nearly a thousand of the distichs were written and about half that number were published in 1797 in Schiller's *Musenalmanach,* where they caused great excitement. There was a shower of 'Anti-Xenia,' to which the perpetrators of the original «Teufelei» (as they called it) paid no attention. They agreed that the published 'Xenia' should be included in the works of both, and that they would give no information as to their separate authorship. Some of the epigrams are sharply censorious, others without any sting at all. The majority, relating as they do to men and matters of ephemeral interest, now seem rather pointless. Their chief historical importance is that they caused Schiller and Goethe to be generally regarded as militant allies fighting the same battle. The two men came to be known as the Dioscuri.

Schiller had now definitely returned to poetry. In conjunction with Goethe he made a study of the epic style and out of this study grew a number of ballads and romanzas which are among the most popular of his works. Special favorites of those who enjoy this phase of Schiller's art are the 'Diver,' the 'Pledge,' the 'Glove' and the 'Cranes of Ibycus.' To this period belong also a group of reflective poems in which he gave expression to the humane idealism and high ethical aspiration which characterize his mature thinking. In this domain he is at his best in the 'Ideal and Life,' the 'Walk' and the 'Song of the Bell.' But his fame rests mainly on his poetic dramas. As director of the little Weimar theatre Goethe was glad to avail himself of his friend's insight and experience in matters of the stage. Schiller, who became a resident of Weimar in 1799, gave assistance in selecting and adapting plays and gradually enriched the local repertory with five creations of his own which are the pride of the German classic drama. He began 'Wallenstein' in 1796, at first purposing to make it a play of ordinary length. The material proved refractory since it dealt only with what Schiller called the cold passions (ambition, hate, malice, vindictiveness), and also because it involved idealizing and creating dramatic sympathy for a traitor. Schiller met the first difficulty by inventing a pair of romantic lovers and managing the plot in such a way that the spectator is forced to see Wallenstein through their partial eyes; the second by giving to Wallenstein a certain loftiness of soul, making much of all the extenuating circumstances and surrounding him with inferior men among whom he towers like a giant among pigmies. The result is that a rather repellant character becomes grand in his final isolation and pitiful downfall. On the whole Wallenstein is the most impressive tragic hero created by any German dramatist. As Schiller's interest in the man and his times deepened the material grew on his hands until he decided to present it in three parts called 'Wallenstein's Camp,' the 'Piccolomini' and 'Wallenstein's Death.' It is, however, no

trilogy in the Greek sense, but a portentously long tragedy in 10 acts, preceded by a dramatic prologue.

Next came 'Mary Stuart,' indubitably the best for the stage of all the many plays in divers languages dealing with the famous Queen of Scots. Here the problem, as Schiller saw it, was to create genuine tragic sympathy for his heroine, but without extenuating her conduct and so making a distinctly Catholicizing play. He solved the problem by concentrating the plot into the last few days of Queen Mary's life and introducing her as a woman whose conscience is heavily burdened by the admitted crimes of long ago, but who feels that in her present plight she is the victim of rank injustice. As she is helpless to avert her impending fate, her situation, according to Schiller's conception of dramative art, is pathetic rather than tragic. It was necessary to make her in some sense visibly responsible for her calamity. To meet this dramaturgic difficulty Schiller resorted to two unhistoric inventions: first, Queen Mary's attempt to escape at the instigation of the Catholic renegade, Mortimer, this attempt endangering the life of Queen Elizabeth; secondly, a meeting of the two queens at which Mary loses control of herself and puts a deadly insult on her rival. This scene is the stage-climax of the play, but its psychological climax comes in the fifth act, when Queen Mary humbly accepts her ignominious death as a divinely appointed expiation for the sins of long ago. While the play's appeal is thus shifted from politics to religion and made to rest on a purely human basis that is neither Catholic nor Protestant, there is much in it that indicates Schiller's artistic sympathy with the Catholicizing tendency of the new romantic movement just then acquiring momentum. The portrait of Elizabeth is little better than a caricature.

Still more marked is the Catholicizing drift in the 'Maid of Orleans,' which was given the subtitle of "romantic tragedy" for the very reason that it requires us to accept the supernaturalism of the legend at its face value. Schiller follows the tradition rather closely except that he makes Joan's "voices" enjoin virginity as a condition of success in her patriotic mission, and that he departs radically from history in respect to the manner of her death. In his view of the matter tragic guilt of some kind was indispensable to tragedy; so he makes Joan fall strangely in love with the English general Lionel just as she is about to take his life on the battle-field. From that instant, feeling that she has violated the spirit of the divine command, she loses her self-confidence and with it her supernatural power. After great suffering and humiliation, which supposedly expiate her offense, she recovers her power by a miracle and dies in glory on the field of battle fighting for France. In this bold romanticization of the Maid's character it was Schiller's deliberate intention to idealize her and rescue her from the obloquy cast upon her by Voltaire's 'La Pucelle.'

His next play was the 'Bride of Messina,' in which he attempted to find a substitute for the Greek chorus. He invented a mediæval plot in which two brothers fall in love with the same girl, who is in reality their sister. She has been brought up in seclusion, her existence unknown to them, in order to defeat the dire prediction of soothsayers. Jealousy and mutual antipathy lead on to the death of both. Schiller provides each brother with a band of retainers who take part in the action and also function as semi-choruses, each speaking through a chosen leader. In what they say an attempt is made to imitate the detached attitude and lofty moralizing of the Sophoclean chorus. Schiller's noble poetic diction is at its very best in the 'Bride of Messina' and especially in the so-called choral passages; but it is evident that words spoken by one person, without group-singing or group-dancing, could convey hardly more than a dim suggestion of the old Greek chorus. Schiller's example has not been imitated and the 'Bride of Messina' is but rarely played.

Last came 'William Tell,' the most popular of all Schiller's plays. It is this stirring and intensely human drama dealing with the revolt of the Swiss farmers against the tyranny of their Austrian governors that has led to the idealization of its author as poet of freedom. It has no hero but the Swiss people, it lacks unity, it violates several of the most approved rules of dramaturgy. Yet there is an appealing charm about it which seldom fails to please, whether it is read as literature or seen upon the stage. After the completion of 'William Tell' in 1804 Schiller addressed himself to a new play on the story of the false Demetrius, reputed son of Ivan the Terrible. He made careful studies of Russian history, sketched numerous scenes and completed the better part of two acts. In the midst of this work on 'Demetrius' he contracted the illness which led to his premature death.

Schiller has always been regarded as the greatest of German dramatists. He had but little of the lyric gift and wrote no songs that have become highly popular. Fastidious critics have often taxed him with being a rhetorician rather than a poet, but anything like posing or insincerity was quite foreign to his nature. His personal character endeared him to all who knew him and he lived his life on a high plane of thought and feeling. His aspiring idealism has always appealed particularly to the young; so that his writings, popularized by school and theatre, are, or at least were, for the Germans a great educative force. His name, linked habitually with Goethe's, stands for all that is best in the best epoch of German letters. See under article headings WALLENSTEIN; WILHELM TELL.

Bibliography.— There is a vast quantity of literature pertaining to Schiller; consult Vol. V of Goedeke's 'Grundriss zur Geschichte der deutschen Dichtung' and the survey in the Appendix to Thomas's 'Life of Schiller.' Fairly recent contributions to literature are Frederic Ewen's 'Prestige of Schiller in England, 1788–1859' (1932), and Otto Peterson's 'Schiller in Russland, 1785–1805' (1934).

The first complete edition of Schiller's works was that of his friend Körner, 12 vols., 1812–15. This formed the basis of the later Cotta editions which appeared in different forms and different degrees of completeness. Down to about 1868 these were rather uncritically edited. Between 1868 and 1872 appeared the Historisch-kritische Ausgabe, 15 vols., edited by Goedeke and others. To the same period belongs the

cheap popular edition issued by Hempel, in Berlin — well edited but unsightly. Good later editions are those of Boxberger and Birlinger, forming part of Kürschner's Deutsche National-Literatur, 12 vols., and of Bellermann, 14 vols., 1895 ff. Of special merit is the Säkular-Ausgabe, 16 vols., 1904. The numerous letters of Schiller, where his style was at its best in Goethe's opinion, have been well edited by Jonas, 7 vols., 1892 ff. Editions of the separate plays, issued by competing publishers for school and college use, are numerous but cannot be listed here.

Biographies short and long are almost legion. Of the early ones those by Carlyle (1825) and by Karoline von Wolzogen, the poet's sister-in-law (1830), are still interesting, as is also the booklet 'Schiller's Flucht von Stuttgart' (1836) by his friend and fellow-traveler, Streicher. Between 1838 and 1842 Hoffmeister brought out his monumental treatise in five volumes, which was followed by the shorter work of Viehoff (1846) and Schaefer (1853). The centenary jubilee of 1859, at which Schiller was glorified as the poet of freedom by Germans all over the world, brought forth a mass of more or less eulogistic literature. Of the longer biographies dating from this epoch of Schiller enthusiasm the best is that of Palleske (1858–59), of which an English translation by Lady Wallace was published in 1860. Less fervid and also less readable are the biographies by Düntzer (1881) and Hepp (1885). Highly learned biographies, going deep into all sorts of minutiæ, were begun by Minor (2 vols., Berlin 1890) and by Weltrich (three instalments in one volume, 1899), but have remained unfinished. The same is true of the less exhaustive work of Brahm (Vol. I, 1892). An excellent illustrated life of Schiller is that of Wychgram (1891). Of solid merit also is the little book of Harnack (1898), the larger one by Kühnemann (5th ed., Munich 1914) and the two-volume treatise by Berger (8th ed., Munich 1914). In English, aside from translations, there are short biographies by Boyesen (New York 1882), Sime (Edinburgh 1882) and Nevinson (New York 1889); also a longer one by Thomas (New York 1901). The best translations of the poems are those of Bulwer Lytton (London 1844) and Arnold Foster (1902).

Noteworthy special studies (but the list is far from complete) are the following: Bellermann, 'Schiller's Dramen' (2 vols., 1898–99; 3d ed., 3 vols., Berlin 1905–08); Köster, 'Schiller als Dramaturg' (Leipzig 1891); Tomaschek, 'Schiller in seinem Verhältnisse zur Wissenschaft' (1862; which won a prize offered by the Vienna Academy); Harnack, 'Die klassische Aesthetik der Deutschen' (Berlin 1892); Rieger, 'Schillers Verhältnis zur französischen Revolution' (Berlin 1885); Wilm, 'The Philosophy of Schiller in its Historical Relations' (Boston 1913); Wiln, E. C., 'Philosophy of Schiller' (New York 1921).

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SCHILLER, *in mineralogy,* a peculiar lustre due to reflection from the surfaces of minute enclosed crystals, probably of goethite. It is best illustrated by sunstone (q.v.), and is also noticed in bronzite, hypersthene and labradorite.

SCHILLING, shĭl'lĭng, **Johannes,** German sculptor: b. Mittweida, Saxony, 23 June 1828; d. 1910. He studied art at Berlin and Dresden. In 1868 he became professor at the Dresden Royal Academy. His chief works include the 'Four Seasons' at Dresden, statues of Schiller at Vienna, of Maximilian at Trieste, the War Memorial at Hamburg and the German National Monument on the Niederwald, opposite Bingen on the Rhine, which bears a colossal figure of Germania, and the statue of Wilhelm I at Wiesbaden (1894).

SCHINDLER, shĭnd'lẽr, **Solomon,** American rabbi: b. Niesse, Silesia, 24 April 1842; d. 5 May 1915. He came to America from Westphalia in 1871, having been for some years out of sympathy with orthodox Judaism, and, after a period of struggle in his adopted country, became known as one of the leaders of the advance movement among Hebrew religionists. He was called to the congregation of Adeth Israel in Boston, Mass., in 1884. In this pastorate he continued nearly 20 years, during which time he not only helped to liberalize the Hebrew faith but to promote a better understanding between American Hebrews and Christians than had before existed. In 1895–99 he was superintendent of the federated Jewish charitable organizations of Boston; in 1899–1909 superintendent of the Leopold Morse House; he then retired. He was author of 'Messianic Expectations and Modern Judaism'; 'Dissolving Views of the History of Judaism'; 'Young West, a Sequel to Bellamy's Looking Backward,' etc.

SCHINKEL, shĭn'kĕl, **Karl Friedrich,** German architect and painter: b. Neuruppin, Brandenburg, 13 March 1781; d. Berlin, 9 Oct. 1841. He was educated at the gymnasium of his native town, and after 1795 in that of Berlin. He became a pupil of Professor Gilly, and on the death of the latter in 1798 succeeded to his private practice as an architect. At the same time he continued his studies, and in 1803 he went with this object to Italy, returning in 1805 by way of France to Berlin. The period of the war being unfavorable for architecture, he took to landscape painting, and from 1808 to 1814 painted a series of dioramas for Gropius. On the return of the royal family to Berlin some of his designs for alterations in the palace were adopted and carried out. In 1811 he was admitted to the Academy, and in 1820 became a professor at the Academy. The designs to which chiefly he owed his architectural reputation include those of the royal guardhouse, the 'Memorial' of the War of Liberation, the new theatre, the new Potsdam Gate, the artillery and engineers' school, all in Berlin; and the observatory; the casinos in Potsdam and Glienicke; and a large number of castles, churches and minor public buildings. As a painter he produced numerous wall and easel pictures. His 'Primeval History of Mankind' in the vestibule of the Berlin Museum exhibits him to advantage as a wall painter. His landscapes are chiefly architectural views, of which the best known are the 'Theatre at Taormina'; 'Square of Saint Mark's, Venice'; 'Ocean Caves near Sorrento'; 'The Cathedral at Milan'; 'Interior of Saint Peter's, at Rome'; 'The Capitol by Moonlight.' He exercised a

profound influence over every department of the art production of his day, including carpet and furniture making.

SCHIPA, Tito, Italian operatic tenor: b. Lecce, Italy, 2 Jan. 1890. He studied under Alceste Gerunda, and came to the United States in 1919, joining the Chicago Opera Association the same year. His repertoire includes 'Sonnambula,' 'Barber of Seville,' 'Lakmé,' 'Traviata,' 'Lucia,' and 'Tosca.' He has been decorated Order of the Crown (Italy); Ordine Civil de Alfonso XII (Spain).

SCHIPKA PASS. See SHIPKA PASS.

SCHIPPERKE. See DOG.

SCHIRMER, shĭr'mĕr, **Johann Wilhelm,** German artist: b. Jülich, Rhenish Prussia, 5 Sept. 1807; d. Carlsruhe, 11 Sept. 1863. He studied historical painting under Schadow at the Düsseldorf Academy until he came under the influence of Lessing's landscapes, whereupon he turned to that *métier,* producing historical landscapes after the manner of Poussin. In 1830 he became assistant professor, and in 1839 professor at the Düsseldorf Academy, meantime visiting and painting in Belgium, the Black Forest, Switzerland, Holland, Normandy and Italy. In 1853 he became director of the art school at Carlsruhe. Among his works are six Biblical landscapes, with the 'Life of Abraham,' National Gallery, Berlin; 'Grotto of Egeria,' 'Nether German Landscape,' Leipzig Museum; series of 26 Biblical landscapes, Düsseldorf Gallery; 'Via Mala,' four landscapes with story of Good Samaritan; 'Storm on the Campagna,' Carlsruhe Gallery.

SCHIST (crystalline), a metamorphic rock generally found only in regions which have been subjected to regional or dynamic metamorphism, that is, those in which the strata have suffered intense folding and shearing. The general characteristics of schists are the fine and pronounced lamination, and crystalline character of component material. They grade on the one hand into gneisses and on the other into scarcely altered mica slates or sandstones. The more important varieties are broadly classified, according to the principal ferro-magnesian silicate present. Thus we have: (*a*) Mica schists; (*b*) Hornblende schists or Amphibolites, and (*c*) various minor schists. The mica schists range in silica from over 80 per cent to less than 50 per cent, according to the amount of quartz present. The most prominent and abundant minerals of this variety are quartz, muscovite and biotite, which are more or less distributed in layers. Among the other minerals present are feldspars, both orthoclase and plagioclase, the rock thus approaching gneiss; garnet, often in large and well-formed crystals; staurolite, cyanite, sillimanite, tourmaline, varying from black through blue, green, red, to white, often of the precious type; opalite, pyrite and magnetite. The term Hydromica schists is used commonly for the finer varieties, in which the scales of mica are indistinguishable (sericite, peragonite, etc.). These pass imperceptibly into phyllites. Mica schists result largely from the metamorphism of sandstones, shales and clays, but also through crushing and excessive shearing of igneous rocks. They are found over wide areas in New England, the Appalachians, Lake Superior and the West. The Hornblende schists or Amphibolites generally result from the dynamic metamorphism affecting igneous or pyroclastic rocks, and rarely from ordinary sedimentary rocks. Hornblende here takes the chief place, quartz being normally absent, while biotite and the basic feldspars are characteristic constituents. Garnet, magnetite, pyrite and other basic minerals are also common. These schists occur as belts in other metamorphic rocks, generally representing dikes, sheets, flows, or ash beds in the sedimentary series. They occur in New England and other Eastern States, and are important in the mineral regions of Lake Superior. They also occur in the Black Hills, and in the Rocky Mountain and California ranges. Among the minor schists may be mentioned chlorite schist, talc schist, epidote schist and others. In each of these, the mineral giving name to the rock is more or less admixed with quartz, feldspars and numerous other minerals. They probably result most commonly from the alteration of igneous rocks, and are found in the older metamorphic districts. See FOLIATION; METAMORPHISM.

SCHIZÆA, skī-zē'ą, the typical genus of the family *Schizæaceæ,* ferns widely distributed, mostly in tropical regions, and which are small and distinct in habit. The sporangia have an entire apical ring and are sessile in close distichous spikes along the middle veins of the narrow pinnæ of the fertile fronds; the sterile fronds are linear, fan-shaped or dichotomously many-cleft. *S. pusilla,* the curly-grass, is the only species in North America, and is very rare and local, being found only in the pine-barrens of New Jersey and Nova Scotia. Its fertile one-sided fronds form the most conspicuous part of this tiny plant, the twisting linear sterile fronds being very like grass. See FERNS AND FERN ALLIES

SCHIZOPODA. See CRUSTACEA; OPOSSUM-SHRIMP.

SCHLATTER, shlät'tĕr, **Michael,** American German Reformed clergyman: b. Saint Gall, Switzerland, 14 July 1716; d. near Philadelphia, Pa., November 1790. He was educated at the University of Helmstedt, taught for several years and then entered the German Reformed ministry. He offered his services as a missionary to the German Reformed emigrants in Philadelphia in 1746, and went to Pennsylvania in that year. He served as pastor of the united churches of Germantown and Philadelphia in 1746–51, organized a synod which met in Philadelphia in 1747 and made extended missionary tours through Pennsylvania, Maryland, Virginia, New Jersey and New York. He visited Europe in 1751, secured a much needed reinforcement of six young preachers, substantial aid in the way of money and returned in 1752. As a result of his appeal £20,000 was raised in England and Holland for the establishment of schools among the Germans in America, and in 1755 Schlatter became superintendent of the enterprise, but in 1757 he resigned because of the opposition encountered from the Germans, who objected to the teaching of the English language in the schools. In 1757 he was appointed chaplain of the Royal American regiment, and

remained with the army until 1759. He then preached at Chestnut Hill and surrounding places. In 1777, while still attached to the royal army, he refused to obey orders on account of sympathy with the colonial cause and was imprisoned. Consult Harbaugh, Henry, 'Life of Rev. Michael Schlatter' (1857).

SCHLEGEL, shlā'gĕl, **August Wilhelm von,** German critic, poet and translator: b. Hanover, 5 Sept. 1767; d. Bonn, 12 May 1845. At the University of Göttingen he received a thorough philological training under Heyne and became an admirer and friend of Bürger, with whom he was engaged in an ardent study of Dante, Petrarch and Shakespeare. From 1791 to 1795 he was tutor in a Dutch family at Amsterdam. Soon after his return to Germany he settled in Jena (1796), following an invitation of Schiller. His critical contributions to Schiller's *Horen* and to the *Jenaer Allgemeine Litteratur-Zeitung,* together with his translations from Dante and Shakespeare, established his literary reputation and gained for him a professorship at the University of Jena (1798). His house became the intellectual headquarters of the "romanticists," and was visited at various times between 1796 to 1801 by Fichte, Friedrich Schlegel, Schelling, Tieck, Novalis and others. From 1798 to 1800 he and his brother Friedrich edited the *Athenæum,* a periodical intended to express the "romantic" view of life and literature. In 1801 he went to Berlin, where he lectured before distinguished audiences on the æsthetic and philosophical creed of the romanticists. In 1804 he began to accompany Mme. de Staël, as tutor to her sons and adviser in her literary work, on her extended travels in Switzerland, France, Italy, England and Scandinavia. Mme. de Staël's book 'De l'Allemagne' shows distinct traces of his influence. In 1808 he was in Vienna and delivered his celebrated 'Vorlesungen über dramatische Kunst und Literatur' (pub. 1809–11). In 1813–17 he acted as secretary to the crown prince of Sweden, after which he joined again the household of Mme. de Staël until her death in 1817. In 1818 he became professor at the University of Bonn. He founded a special printing office for Sanskrit and edited several old Indian texts. As an Orientalist he was unable to adapt himself to the new methods opened by Bopp. As a critic he carried on the tradition of Lessing and Herder. Without possessing Lessing's power of style and personality he commanded a wider range of artistic susceptibility. His unerring linguistic and historical scholarship and the calm objectivity of his judgment enabled him to carry out, even more successfully than Herder himself, Herder's demand that literary criticism should be based on a sympathetic penetration into the specific individuality of each poetic production rather than on the application of preconceived æsthetic standards. He established models for the new method of analytical and interpretative criticism in his essavs on Goethe's 'Hermann and Dorothea' and on Shakespeare's 'Romeo and Juliet.' His Vienna lectures 'On Dramatic Art and Literature' were translated into most of the languages of Europe and stand as a permanent contribution to critical literature; his definition of the terms "classic" and "romantic" met with general recognition; his views on the so-called "three unities" and on the "correctness" of Shakespeare evoked an especially strong echo in England and finally made the Johnsonian attitude toward Shakespeare appear obsolete.

Formal perfection of language is the chief merit of his poems, which suffer from a lack of originality. In his drama 'Ion' (1803) he vainly attempted to rival Goethe's 'Iphigenie.' He prided himself on being "model and master in the art of sonnets" among the Germans. He is at his best in sparkling literature parodies such as 'Ehrenpforte und Triumphbogen für Kotzebue' (1801).

His universal receptivity for poetical values, together with his rare facility of linguistic expression, predestined him to be a translator of the first order. His translations from Shakespeare were his greatest artistic contribution to German literature. It is due to him that Shakespeare is hardly less known in Germany than he is in England. Only 17 plays of the so-called Schlegel-Tieck Shakespeare were translated by Schlegel (1797–1810); the remainder were added, from 1825 to 1833, by Graf Wolf Baudissin and (very inadequately) by Dorothea Tieck, while Tieck himself acted only as a reviser and annotator. Schlegel also translated parts of Dante's 'Divina Commedia' (1791–97). His 'Blumensträusse, italiänischer, spanischer und portugiesischer Poesie' (1804) included Petrarca's sonnets. The two volumes of 'Spanisches Theater' (1803–09) introduced five plays of Calderon into German literature. His theoretical essays on the art of translating have guided several generations of German translators. His breadth of culture made him truly a "cosmopolitan of art and poetry." As a critic and as a translator he has lastingly contributed to the realization of Goethe's idea of a "Welt-Literatur."

His first wife, Caroline Michaelis (1763–1809), whom he married in 1796, was the widow of Dr. Böhmer. She was the most brilliant among the "romantic" women. She assisted Schlegel in some of his literary productions, and the publication of her correspondence in 1871 established for her a posthumous reputation as probably the greatest of German letter-writers. She separated from Schlegel in 1801 and became the wife of the young philosopher, Schelling, soon after.

Bibliography.— Schlegel's 'Sämtliche Werke' have been edited in 12 volumes by E. Böcking (1846); 'Vorlesungen über schöne Literatur und Kunst' (ed. by Minor, 3 vols., 1884); 'Œuvres écrites en français' (3 vols., 1846). Consult Strauss, D. Fr., 'Kleine Schriften' (1862); Haym, R., 'Die romantische Schule' (1870; new ed., 1914); Huch, Ricarda, 'Blütezeit der Romantik' (1899); 'Caroline, Briefe aus der Frühromantik' (ed. by Erich Schmidt, 2 vols., 1913); Sidgwick, Mrs. Alfred, 'Caroline Schlegel and her Friends' (1889); Bernays, M., 'Zur Entstehungsgeschichte des Schlegelschen Shakespeare' (1872); Genée, R., 'A. W. Schlegel und Shakespeare' (1903); Gundolf, F., 'Shakespeare und der deutsche Geist' (1911); Helmholtz, A. A., 'The Indebtedness of S. T. Coleridge to A. W. Schlegel' (1907).

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SCHLEGEL, Karl Wilhelm Friedrich von, German critic and philosophical writer,

brother of A. W. Schlegel: b. Hanover, 10 March 1772; d. 11 Jan. 1829. As a student at Göttingen and Leipzig he was a voracious reader, especially of the classics. In his earliest publications, including the important essays 'Von den Schulen der griechischen Poesie' (1794); 'Über die Diotima' (1795); 'Über das Studium der griechischen Poesie' (1797), he appeared as a brilliant classical scholar and as an ardent worshipper of the objective harmony of "pure Hellenism." His unfinished 'Geschichte der Poesie der Griechen und Römer' (1798) had a lasting influence on the modern conception of the æsthetic values of Homer. But Schiller's distinction of two separate artistic types (the "naïve" and the "sentimental"), together with the consciousness of his own disharmonious self, caused him to discard his "graecomania." In Jena and in Berlin, where he alternately resided between 1796 and 1802, he was deeply influenced by Fichte, Schleiermacher and Schelling. During this period he wrote his essay 'On Goethe's Wilhelm Meister' (1798), his 'Gespräch über die Poesie' (1800) and a great mass of aphorisms, published as 'Fragmente' and 'Ideen.' Most of these works appeared in the *Athenæum,* which he conducted conjointly with his brother from 1798 to 1800. They are now generally recognized as the deepest and most significant expressions of the subjective idealism of the early romanticists. Most of their peculiar catchwords have been created by F. Schlegel. To him, religion is identical with "Bildung," with the free and endless cultivation of each man's individuality toward the "divine centre." "Romantic poetry" should be "progressive Universalpoesie"; it should give, in endless progression, intimations of the infinite through earthly symbols. "Romantic irony" is the necessary state of mind that enables us to recognize the appearances of life and poetry as mere "allegories" of infinite meanings. F. Schlegel was extremely fertile in discovering and illuminating new problems in the psychology of art, literature and ethics, so that he has been frequently called the forerunner of Nietzsche. But his mystical and paradoxical terminology made these "fragments" almost unintelligible to the general public, until Wilhelm Schlegel simplified and systematized his brother's ideas in his Berlin and Vienna lectures. Friedrich's eccentric novel, 'Lucinde' (1799), in which he extolled the union of sensual and spiritual love as an allegory of the divine cosmic Eros, caused a great scandal by its manifest autobiographical character, and contributed to the failure of his academic career in Jena. In 1802 he went to Paris, where he edited a monthly periodical, *Europa,* and began the study of Sanskrit. His book 'Über die Sprache und Weisheit der Indier' (1803) was the first scholarly treatment of its subject. After having embraced the Catholic faith he went to Vienna (1808), where he was employed in several official and diplomatic positions. Having gained the confidence of Metternich he secured the appointment as Austrian counsellor of legation at the Diet of Frankfort (1815). In 1818 he was again at Vienna. His later works, including 'Geschichte der alten und neueren Literatur' (1815), 'Philosophie des Lebens' (1828) and 'Philosophie der Geschichte' (1829) show an increasingly dogmatic standpoint in religious questions and reactionary tendencies in politics.

His wife, Dorothea (1763–1839), was the daughter of Moses Mendelssohn, the Jewish philosopher. In 1798 she left her first husband, the banker Veit, in order to become F. Schlegel's devoted "comrade" and literary helpmate. She published the products of her own pen, including the novel 'Florentin' (1801), under her husband's name; her adaptations of 'Merlin the Magician' (1804) and of 'Loher and Maller' (1805) have been included in Bohn's English edition of Schlegel's collected works. The 'Sämtliche Werke,' published in 15 volumes (1846), excluded the most important works of his pre-Parisian period. His 'Prosaische Jugendschriften,' on which his fame now rests almost entirely, were collected in two volumes by J. Minor (1882). Good selections ('Fragmente') were edited by E. von der Leyen (1904); 'Briefe an seinen Bruder Wilhelm,' ed. by Walzel (1890); Haym, R., 'Die romantische Schule' (1870; new ed., 1914); Wernaer, R. M., 'Romanticism' (1910); Joachimi, 'Die Weltanschauung der Romantik' (1905); Rouge, J., 'Frédéric Schlegel et la genèse du romantisme allemand' (1904); Enders, C., 'F. Schlegel' (1913).

Traugott Böhme,
Professor of Greek and History.

SCHLEICHER, shlī'hêr, **August,** German philologist: b. Meiningen, 19 Feb. 1821; d. Jena, 6 Dec. 1868. He devoted himself to the study of theology and Oriental languages, first at Leipzig and afterward at Tübingen. In 1846 he took the degree of doctor of philosophy at Bonn, and soon after qualified himself as a teacher of philology, to which he ever after devoted himself. In 1850 he was called to Prague as extraordinary professor of philology, a chair soon exchanged for that of comparative philology. At Prague he made himself more fully acquainted with the Slavonic languages and undertook a several months' journey to Lithuania in order to learn the Lithuanian language. In 1857 he accepted the appointment of honorary professor of the science of language and Old German philology in the University of Jena, where he continued until his death. He published a work on the comparative history of languages, 'Zur vergleichenden Sprachengeschichte' (1848), and another containing a systematic review of the European languages, 'Die Sprachen Europas' (1850). Later works are 'Die Formenlehre der kirchenslawonischen Sprache, erklärend und vergleichend dargestellt' (1853); 'Handbuch der litauischen Sprache' (1856–57). 'Zur Morphologie der Sprache'; 'Die deutsche Sprache' (1860); 'Kompendium der vergleichenden Grammatik der indogermanischen Sprachen'; 'Die Darwinische Theorie und die Sprachwissenschaft'; 'Ueber die Bedeutung der Sprache für die Naturgeschichte des Menschen' (1865).

SCHLEIDEN, shlī'dĕn, **Matthias Jakob,** German botanist: b. Hamburg, 5 April 1804; d. Frankfort, 23 June 1881. He was educated for the law in Heidelberg, but in 1833 took up the study of botany. He occupied the chair of botany at Jena from 1839 to 1863, when he was called to the Botanical Gardens at Dorpt. He was one of the first botanists to study plant

tissue, and his name is associated with that of Nageli, the Swiss botanist, in the early development of the cell theory. His works include 'Grundzüge der wissenschaftlichen Botanik' (1842–43; trans. into English as 'Principles of Scientific Botany,' 1849); 'Die Pflanze und ihr Leben' (1848); 'Baum und Wald' (1870); 'Die Rose' (1873).

SCHLEIERMACHER, shlī'ĕr-mäk'ĕr, **Friedrich Ernst Daniel,** German theologian and philosopher: b. Breslau, 21 Nov. 1768; d. Berlin, 12 Feb. 1834. He was educated by the Moravian Brethren at Niesky. In 1787 he began at Barby the study of theology, which he continued at Halle. In 1794 he was ordained and appointed assistant preacher at Landsberg on the Warthe. From 1796 to 1802 he was chaplain in the Charité-Haus at Berlin. During this period he translated some of Plato's Dialogues, contributed to the *Athenæum* conducted by the two Schlegels, and wrote the 'Discourses on Religion,' the 'Monologues' and 'Letters of a Minister out of Berlin.' In 1802 he published his first collection of sermons, which was followed by two others. In 1802 he removed to Stolpe, where he wrote his 'Critical View of Ethics.' In 1804 he was appointed extraordinary professor of theology at Halle. In 1807, when Halle was separated from Prussia, he went to Berlin and lectured there as well as preached. In 1809 he was appointed preacher at the Trinity Church in Berlin. With Fichte and W. von Humboldt he took a prominent part in the founding of the University of Berlin (1810) and remained, until his death, one of its most distinguished and successful professors. In 1811 he was elected a member of the Academy of Sciences and in 1814 secretary of the philosophical class. His liberal political activity and also his advocacy of doctrinal liberty as a basis of union between the Lutheran and Reformed churches procured him the disfavor of the Prussian government. As a preacher and writer he attracted a large and influential following, especially among the cultured classes, through the eloquent beauty of his style, through his broad interest in the intellectual and artistic movements of his time and through a rare combination of deep religious feeling with critical freedom toward traditional dogmas and conventional morality.

His 'Discourses on Religion, addressed to the educated among its despisers' (1799), show him under the influence both of Spinoza's pantheism and of Kant's criticism. Dissatisfied with the popular rationalistic theology of his times no less than with Kant's moralistic interpretation of religion, he assigns to religion a special province of the human soul, conceiving it to differ essentially from the intellectual and ethical sphere of our mind. Religion, therefore, is neither knowledge nor practice, but a state of feeling, an elevating tone of the whole mind. One of the main characteristics of religious experience is the feeling of being one with the All, the sentiment of an all-embracing and all-absorbing life. This «intuition (Anschauung) and feeling of the universe» does not imply any specific religious creed, not even the belief in a personal God or in the immortality of the soul. It merely establishes an emotional relation of oneness between the individual and the All; the finite self feels its absolute dependence upon the infinite. But this cosmic emotion constitutes, according to Schleiermacher, only one manifestation of religious sentiment; its equally important counterpart is the «self-intuition» and «self-determination» of a man's own «eternal self.» Thus he reasserts the value of human personality, which had been somewhat neglected in Kant's system.

In his 'Monologues' (1800) he assimilates, from the monadology of Leibniz, the idea that each individual is an independent mirror of mankind as a whole and is destined to realize within itself the common ideal in an individual example. Each one should represent mankind in his own way, that is the first principle of morality. But the individual comes to life only in the whole. Thus Schleiermacher, contrary to Kant's ethical formalism, attaches great importance to the actual contents and results of morality, to existing institutions of culture and morality such as the family, society, church, state, arts, sciences, historical religions. The establishment of a higher order of things through the combined individual effort of human beings in human society becomes the central idea of his religious ethics. In his later writings, especially in his 'Christian Morality' and 'Christian Faith' the free philosophical religiousness of his 'Discourse' and 'Monologues' gave way to a more definite appreciation of the historical or «positive» religions and their consummation in Christianity. He find in the person of its founder a living presentation of the endless process at the end of which appears the union of the divine and the human. By such interpretation he is enabled to adopt the Christian Church as a gradual realization in practice of the divine order of things, of the Civitas Dei. All positive affirmations with reference to the Deity he held to be figurative and anthropomorphic. In his 'Life of Jesus,' which anticipated that of D. F. Strauss in important respects, he appears as one of the first representatives of the critical school of Biblical research. His 'Dialektik' assumes the identity of thinking and being as the indispensable presupposition of all knowledge. His works on psychology, on æsthetics, on pedagogy have recently won renewed attention. Schleiermacher occupies a unique position as a representative alike of philosophy and theology. Practically all the modern endeavors to investigate the function of religion in the life of the human soul can be traced back to Schleiermacher. He is generally regarded as the greatest theologian of the Protestant Church since the time of the Reformation. His works have been published in three series entitled 'Theology' (11 vols.), 'Sermons' (10 vols.), 'Philosophical and miscellaneous writings' (9 vols.), Berlin 1836–65. Otto Braun edited an excellent critical selection from his works in four volumes (1910–13). The 'Discourses' and the 'Monologues' have been published in separate editions. Consult Dilthey, 'Leben Schleiermachers' (1870); 'Schleiermacher's Life, as unfolded in his Autobiography and Letters' (tr. by T. Rowan, London 1860, 2 vols.); Bender, W., 'Schleiermachers' Theologie' (2 vols., 1876–78); Lichtenberger, 'History of German Theology in the 19th Century' (1889); Pfleiderer, 'Protestant Theology in Germany since Kant' (1890); Troeltsch et al., 'Schleiermacher, der Philosoph des Glaubens' (1910); Cramaussel, 'La philosophie religieuse de Schleiermacher' (1908);

Siegmund-Schultze, 'Schleiermacher's Psychologie' (1913).

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SCHLESINGER, slĕs'ĭn-jĕr, **Frank,** American astronomer: b. New York, 11 May 1871. He was graduated at the College of the City of New York in 1890 and took his Ph.D. at Columbia in 1898. He was an observer in charge of the International Latitude Observatory, Ukiah, Calif., 1899–1903; astronomer Yerkes Observatory 1903–05; director Allegheny Observatory 1905–20; director Yale University Observatory from 1920–41. He was a member of various scientific societies and wrote numerous papers on variations of latitude, spectroscopic binaries, stellar parallaxes, etc. Died, Lyme, Conn., 10 July 1943.

SCHLESWIG, shlāz'vĭg, Germany, a seaport in the province of Schleswig-Holstein, Prussia, at the head of the Schlei, 29 miles northwest of Kiel. It resembles a Dutch town in point of architecture and is divided into three parts — the Alstadt, or Old Town, the Lollfuss and the Friedrichsberg. The only square is the market-place in the Altstadt. The principal street, two miles long, is the Lollfuss. The buildings of importance are the three churches, of which the cathedral (12th century) is a fine Gothic pile, with a tower 368 feet high. Other buildings are the old castle, various benevolent institutions and the Convent for Noble Women. At the south are the remains of a wall erected by pagan kings against the invasion of Jutlanders. As early as the 9th century the city was a great mart for exchange of goods between the countries of the North Sea and those of the Baltic. The chief manufactures are woolen goods, laces, sugar, earthenware and leather. There are seven annual fairs. Pop. 19,905.

SCHLESWIG-HOLSTEIN, shlāz'vĭg-hōl'stīn, a former maritime province of Prussia, between Denmark on the north; the Baltic, Lübeck and Mecklenburg on the east; Mecklenburg and the territory of Hamburg on the south; Hanover southwest and the North Sea on the west. It covers an area of 5,818 square miles. Schleswig is separated from Holstein by the Eider and the Schleswig-Holstein Canal. The province includes several islands in the Baltic and North seas and belongs to the great North German plain. Heligoland belongs to the province. The hilly district on the eastern coast contains the most productive land in the province; the central part is nearly barren, the western coast is protected by many dikes, and is fertile. The Baltic Coast, about 300 miles long, is hilly and contains numerous fjords which make excellent harbors. The North Sea Coast is low and flat. The Elbe forms the boundary on the south for 65 miles. The Eider is the principal river. Other rivers are the Trave and Stor. There are numerous lakes in the northeast, chief of which are Witten-See and Gotteslogs-See. The chief occupations of the inhabitants are agriculture and stock-raising. The majority of the occupants of Schleswig are Danish; of Holstein, German. The industrial works include sugar refineries, breweries and distilleries. The principal ports are Altona, Heligoland, Kiel, Flensburg, Neumühlen, Wyck and Tonning, and the capital, Schleswig. The province became a united duchy in 1386. By the Treaty of Prague, North Schleswig was to choose between Denmark and Prussia, but the privilege was ignored. Its history is a record of continuous strife between Danes and Germans, closing in favor of the latter. The united government of Holstein and Schleswig was first recognized by Margaret of Denmark in 1386, and the basis of this union was the Succession Act, and the practical contradiction between their feudal duty and their own inseparable connection gave rise to the celebrated "Schleswig-Holstein question," causing interminable separations and fusions. By the protocol of 1850 England, France, Austria, Russia, Sweden and Denmark settled, as far as diplomacy could, the much-discussed and difficult question of the duchies of Schleswig and Holstein in favor of Denmark. The unity of Denmark, Schleswig, Holstein and Lauenburg was secured by a uniform law of succession, and as far as was practicable their internal affairs were placed under a common administration. The protocol was succeeded by the treaty of 1852, which historians call "its logical consequence." This treaty assigned the succession to the kingdom of Denmark and the duchies to Prince Christian of Glücksburg, and declared the integrity of the whole Danish monarchy to be permanent; but the rights of the German Confederation with regard to Holstein and Schleswig were "reserved." The declaration was made in accordance with the views of France, Russia and England; the reservation was inserted in the interest of the German powers. It was under this protocol and its succeeding treaty that Denmark expected the aid of England when, in 1864, Austria joined with Prussia to overthrow the treaty and seize Schleswig-Holstein. England called a conference of the signatory powers and attempted by peaceful means to put an end to the war. To quote a modern historian in 'The Historians' History of the World,' "English diplomacy had made every effort imaginable to save the London Protocol and the integrity of the Danish State; but the sole price at which Napoleon III conjointly with England would venture on the strife, the conquest of the left bank of the Rhine, seemed too high, and so it satisfied itself with inviting the subscribers of the protocol to a conference in London. The latter met for no other purpose than the rupture of the protocol, from which the German powers also detached themselves, and to confirm the overthrow of the Danish State, which at the close of the diplomatic tournament saw itself thrown on its own resources. The first notable encounter between British and German warships after the opening of the World War occurred off Heligoland on 28 Aug. 1914.

The Treaty of Versailles of 1919 made provision for settling the ultimate fate of this province by plebiscite. For this purpose Schleswig was divided into two zones. The plebiscite was held in March 1920, when the vote in the northern zone was in favor of incorporation with Denmark, that in the southern was for remaining in Germany. The possession of Holstein, of course, was not in question. The result was a loss of 1,535 square miles of the province to Germany. Pop. of province and Heligoland, 1,519,365. See DENMARK.

SCHLEY, slī, **Winfield Scott,** American naval officer: b. near Frederick, Md., 9 Oct.

1839; d. New York, 3 Oct. 1911. He was graduated at the United States Naval Academy in 1860 and went as midshipman on the *Niagara* to China and Japan. Returning in 1861, he was made master, served on the *Winona* in the West Gulf blockading squadron, later on the *Monongahela* and the *Richmond,* and participated in all the engagements which led to the capture of Port Hudson in 1863, having been promoted to the rank of lieutenant in 1862. Ordered from Southern waters in 1864 to the Pacific squadron, he served on the *Wateree* as executive officer till 1866, when he was promoted lieutenant-commander. In this period he suppressed an insurrection of Chinese coolies on the Chincha Islands, and for protection of United States interests landed a body of men at San Salvador during a revolution. From 1866 to 1869 he was instructor at the Naval Academy; then, being assigned to the Asiatic station, served there on the *Benicia* for three years, earning distinction at the taking of the Korean forts on the Salee River in 1871. Again, in 1872, he was detailed as instructor at the Naval Academy, and in 1874 was made commander. After serving in Europe and on the west coast of Africa, he commanded the *Essex,* on the Brazil station, 1876–79. He was selected to command the third government relief expedition (1884) for the rescue of Lieut. A. W. Greely (q.v.), which he promptly accomplished. Having served (1885–89) as chief of the Bureau of Recruiting and Equipment, he was promoted captain in 1888. From 1889 to 1891 he was in the southern Pacific as commander of the cruiser *Baltimore,* and in the latter year interposed at Valparaiso, Chile, when American sailors were assaulted in the streets.

In 1895 he was placed in command of the *New York;* was chairman of the Lighthouse Board 1897–98; in February of the last-named year became commodore, and after the outbreak of the war with Spain was given command of the Flying Squadron. Sailing from Hampton Roads, 13 May 1898, he began the historic search for Cervera's Spanish fleet, discovered it and finally established a blockade of the harbor at Santiago de Cuba (see UNITED STATES — WAR WITH SPAIN), where, on 29 May, Cervera was found to be. Schley's squadron was united 1 June with the fleet under acting Rear-Admiral W. T. Sampson (q.v.) and the blockade was continued until 3 July, when the Spanish ships came out of the harbor and were destroyed by the American vessels, which, during the temporary absence of Sampson, were under the immediate command of Commodore Schley, on board the *Brooklyn.* In August 1898 Schley was raised to the rank of rear-admiral.

An unfortunate controversy arose between partisans of Schley and those of Sampson over their respective claims to the credit of this great victory. Of that discussion neither officer personally took public notice until after the appearance of a work by Edgar Stanton Maclay (q.v.), entitled 'History of the United States Navy,' in which the author referred to Commodore Schley as a "caitiff, poltroon and coward." The proofs of the book had been read and approved by various naval officers, among them Rear-Admiral Sampson; and on 22 July 1901 Schley applied to the Secretary of the Navy for a court of inquiry. This request was granted 24 July. The court was convened 12 September and its sessions continued for one month. It consisted of Admiral Dewey, president, and Rear-Admirals Benham and Ramsey. The verdict, returned 14 Dec. 1901, was a disagreement, Admiral Dewey refusing to subscribe to censures on Schley's conduct which were made by the two other members. The "majority" report, signed by two members only, found Schley guilty of vacillation, lack of enterprise and disobedience, and in other particulars strongly criticised his conduct, both before and during the battle of Santiago de Cuba, while recognizing his personal courage in the action. Admiral Dewey, however, presented a "minority" report, in which he praised Schley for promptness and efficient service, and gave him the credit for the destruction of Cervera's fleet. Schley filed with the Secretary of the Navy objections to the "majority" report, but it was nevertheless approved by Secretary Long, 20 Dec. 1901. In January 1902, Rear-Admiral Schley appealed from the verdict to the President, who, however, confirmed Secretary Long's approval. On recommendation of the court, no action was taken upon its findings. Schley's retirement from active service at the age limit occurred 9 Oct. 1901. In collaboration with J. R. Soley (q.v.), he wrote 'The Rescue of Greely' (1886); he also wrote 'Forty-five Years under the Flag' (1904).

SCHLICH, shlĭk, SIR **William,** English forester: b. Darmstadt, 1840; d. 25 Sept. 1925. He was educated at Darmstadt and Giessen and was appointed in 1866 to the Indian forest department. He held the offices of conservator of forests, 1871, and inspector-general of forests, 1881; and organized the first school of forestry in England, at Cooper's Hill, in 1885. He was made F.R.S. in 1901 and knighted in 1909. He is the author of 'A Manual of Forestry' (5 vols., 1889–96); 'The Outlook of the World's Timber Supply'; 'Afforestation in Great Britain and Ireland'; 'Forestry in the United Kingdom.'

SCHLIEMANN, shlē'män, **Heinrich,** German archæologist: b. Neubuckow (Mecklenburg-Schwerin), 6 Jan. 1822; d. Naples, 27 Dec. 1890. He spent five years as a pupil in retail business in Fürstenberg, then embarked as cabin-boy on board a ship bound for Venezuela. The ship was wrecked on the coast of Texel, but Schliemann was saved and taken to Amsterdam. Here he obtained a post in a commercial house and set himself to acquire a thorough knowledge of the chief European languages. In 1846 he was sent to Saint Petersburg as agent for another Amsterdam firm. In 1850 he happened to be in California on 4 July when the State entered the Union and acquired American citizenship. By 1856 he had learned modern Greek and begun the study of ancient Greek, and in 1858–59 traveled in Sweden, Denmark, Germany, Italy, Egypt, Syria and Greece. Having amassed a considerable fortune in trade, he retired from it in 1864 in order to devote himself wholly to archæological studies. He traveled round the world in 1864–66, and in 1868 went to the coast of Asia Minor by way of Corfu and the Morea. In 1870 he undertook at his own cost the excavation of the heaps of ruins at Hessarlik, in the Troad, which he believed to be the site of ancient Troy

(q.v.). These excavations he carried on with interruptions until 1890. Contrary to agreement with the Porte, he retained possession of all the spoils discovered there, and was compelled by the Greek courts to pay the sum of $10,000. He presented his collections to the Museum für Völkerkunde at Berlin. In 1876 he began similar excavations at the site of ancient Mycenæ in Greece. Little confidence was at first placed in his methods by trained archæologists, and when his discoveries had been made their historical value was for a time doubted. But scholars now generally agree that they attest powers adequate to the Trojan War, and make the traditional account probable in its main outlines. Consult his autobiography edited by his wife (Leipzig 1891); Schuchardt, 'Schliemann's Excavations and Archæological and Historical Studies' (London 1891); Sandys, J. E., 'A History of Classical Scholarship' (Cambridge 1908); Hawes, C. H. and H., 'Crete: the Forerunner of Greece' (London 1909).

SCHLOSSER, shlŏs'sĕr, **Friedrich Christoph,** German historian: b. Jever, Oldenburg, 18 Nov. 1776; d. Heidelberg, 23 Sept. 1861. He studied at the University of Göttingen 1794–98, and published his first history, 'Geschichte der bildersturmenden Kaiser des Oström' in 1812. He was professor in the Lyceum of Frankfort 1812–14 and city librarian until 1819, when he was called to Heidelberg as professor of history at the university, a position retained until his death. Schlosser's writings, which are characterized by a great love of truth and a high moral tone in judgment, include 'Weltgeschichte in zusammenhängender Erzählung' (1817–24); 'Geschichte des 18. Jahrhunderts' (1823); 'Universal-historische Uebersicht der Geschichte der alten Welt und ihre Kultur' (1824–34).

SCHLUNDT, shlŭnt, **Herman,** American chemist: b. Two Rivers, Wis., 16 July 1869. He was graduated at the University of Wisconsin in 1894 and took his Ph.D. at the University of Leipzig in 1901. He was for a time connected with the faculty at the University of Wisconsin, and from 1902 was associated with that of the University of Missouri, where he was professor of physical chemistry from 1907, and chairman of the department of chemistry in 1910–15. He is author of numerous articles on physical chemistry and radio-activity and of 'Laboratory Experiments in General Chemistry' (1912).

SCHLUTER, shloo'tĕr, **Andreas,** German sculptor and architect: b. Hamburg, 20 May 1664; d. Saint Petersburg, 1714. His father was a sculptor and brought him in early life to Dantzig. He left that place for Marschau, where he opened a studio as a sculptor and eventually (1694) settled in Berlin. The Baroco style of architecture, then popular in Holland, attracted his fancy and in this style he began (1696) to make designs for rebuilding the royal residences. Before carrying them out he took a journey through Italy, where he built the central front of the castle at Charlottenburg, and subsequently began the restoration of the royal castle at Berlin and became actively engaged in designing buildings of this class in other parts of the country. He eventually removed to Saint Petersburg and became court architect to Frederick the Great. Among the statues he erected in Berlin are the statue of the grand elector (cast by Jacobi in 1700). Besides the bronze statue of the Grand Elector Frederick III at Königsberg, the tomb of Frederick I and his wife in Berlin and the marble screen in the church of Saint Mary, he produced numerous designs for the gorgeous interior decoration of the Goldsmiths' Hall, Berlin, and other buildings. Consult Adler, 'Andreas Schlüters Leben.'

SCHMALKALDEN, shmäl'käl''dĕn, **Articles of,** a Protestant confession which was drawn up at the instance of John Frederick, Elector of Saxony, by Luther and other divines, and signed at Schmalkalden in February 1537. These articles were essentially the same as those of the Confession of Augsburg, but in much stronger language. See Reformation, The.

SCHMALKALDIC LEAGUE, the league formed at the close of 1530 by the Protestant princes of Germany, assembled at Schmalkalden, to resist the aggressive measures contemplated by the Emperor Charles V. It ultimately included the whole of northern Germany, Saxony, Würtemberg and Denmark, with portions of Bavaria and Switzerland. The object of the league was the common defense of the political and religious freedom of the Protestants, and the confederacy was first intended to continue only for six years, but subsequent events induced them in 1535 to renew it for another period of 10 years, and to raise a permanent army to carry out the objects of the league. About this time it was joined, among others, by the king of France, Francis I, though only from political motives, and Henry VIII of England declared himself its protector. The confederacy received a fuller consolidation by a new Protestant confession, drawn up at the instance of John Frederick of Saxony by Luther and other divines, and known as the Articles of Schmalkalden, from the circumstance of their having been signed (1537), like the league itself, at the town of Schmalkalden. These articles were essentially the same as those of the Confession of Augsburg. The league was latterly crippled by mutual jealousy and the conflict of interests, and its early successes in the so-called Schmalkalden War were ultimately more than outweighed by the complete rout at Mühlberg and the capture of John Frederick. The ends of the league, however, were ultimately gained through the instrumentality of Duke Maurice, now Elector of Saxony, who in 1552 declared war against the emperor, and forced him in 1552 to grant the Treaty of Passau, which secured the religious liberty of the Protestants. See also Charles V; Reformation, The.

SCHMAUK, smâk, **Theodore Emanuel,** American clergyman: b. Lancaster, Pa., 1860; d. 23 Mar. 1920. He was graduated at the University of Pennsylvania in 1880, ordained to the Evangelical Southern ministry in 1883; was editor-in-chief of the *Lutheran Church Review* from 1895; literary editor of the *Lutheran* from 1889; professor of Christian faith in the Lutheran Theological Seminary from 1911 and president of the General Council of Evangelical Lutheran Churches in North America from 1903. He published 'The Negative Criticism of the Old Testament' (1894); 'History of Old Salem and Lebanon' (1898); 'The Early

Churches of the Lebanon Valley (1902); *The History of the Lutheran Church* (1903); *The Confessions and Confessional Principle of the Lutheran Church* (1909); and *Christianity and Christian Union* (1913).

SCHMID, shmĭt, **Matthias,** Austrian painter: b. See, Tirol, Nov. 14, 1835; d. Munich, Jan. 22, 1923. He studied at the Munich Academy (1856) under Johannes von Schraudolph, and was a pupil of Karl von Piloty (1869), when the persecution to which the clergy subjected him on account of his liberal views caused him to leave Tirol. He won the Vienna medal in 1873.

Among his canvases are *The Entombment; The Flight into Egypt; Festival of the Parson's Cook* (1874); *The Betrothal* (1879); *Repairing the Damage* (1882); *Blind Man's Buff* (1884); *Forsaken* (1885); *In the Picture Gallery* (1886). He has also done in fresco at the Innsbruck Cemetery *The Three Marys at Christ's Tomb* (1859).

SCHMID, Ulrich, German historian: b. Niederrieden, Swabia, July 4, 1876. He was educated at the Memmingen Latin School and the Würzburg Gymnasium, the universities of Würzburg, Freiburg-in-Breisgau, Munich, and Vienna. He has devoted much of his time to the study of the history of culture and from 1904 edited *Walhalla* at Munich. He published a number of church histories and biographies and also edited *Das katholische Kirchenjahr in Bildern* (1910), and the religious art series of *Glaube und Kunst* since 1912.

SCHMIDT, shmĭt, **Johannes,** German philologist: b. Prenzlau, July 29, 1843; d. Berlin, July 4, 1901. After study at the University of Bonn he was there made professor (1873), in the same year removed to Grätz, and from 1876 until his death was at Berlin. In 1884 he was elected to the Prussian Academy of Sciences. Probably he was not excelled by any scholar of his time in an extensive scientific knowledge of the grammar of the Indo-German group of languages. In addition to his philological works he edited, from 1875 (with Kuhn), the *Zeitschrift für vergleichende Sprachforschung.*

SCHMIDT, Kaspar, German philosopher, better known under his pseudonym of Max Stirner (q.v.).

SCHMIDT, Nathaniel, American Orientalist: b. Hudiksvall, Sweden, May 22, 1862; d. Ithaca, N. Y., June 30, 1939. He was educated at the universities of Stockholm, Colgate, and Berlin, and was professor of Semitic languages and literatures at Colgate University, 1888–1896, and professor of Semitic languages and Oriental history at Cornell University, 1896–1932; emeritus thereafter. He was director of the American School of Archaeology in Jerusalem, 1904–1905, and later was a member of the board of trustees of the American Schools of Oriental Research in Jerusalem and Baghdad. His published works include *Introduction to the Hexateuch* (1896); *Biblical Criticism and Theological Belief* (1897); *Syllabus of Oriental History* (1897); *The Republic of Man* (1899); *Outlines of a History of Egypt* (1901); *The Prophet of Nazareth,* 2d ed. (1907); *The Messages of the Poets* (1911); *Ibn Khaldun, Historian, Sociologist, Philosopher* (1930); *The Coming Religion* (1930).

SCHMITZ, Eugene F., American politician: b. San Francisco, Aug. 27, 1864; d. San Francisco, Nov. 20, 1928. He was elected mayor of San Francisco on the Union Labor ticket in 1900 and was twice re-elected. In 1907 he, with Abe Ruef (q.v.), was tried on a charge of extortion in connection with the sensational graft scandals then uncovered. He was convicted, but succeeded in having the judgment set aside. Later he again became active politically and he was his party's candidate for mayor in 1915, but was not elected.

SCHMUCKER, shmŭk'ẽr, or **SMUCKER, Samuel Mosheim,** American historical writer: b. New Market, Va., Jan. 12, 1813; d. Philadelphia, Pa., May 12, 1863. He was graduated at Washington College, Pennsylvania, in 1840, and was licensed to preach in the Lutheran Church. In 1848 he resigned his duties as a pastor to study law, was admitted to the bar and practiced for a time in Philadelphia; but after 1855 devoted himself almost wholly to literature. He was the author of numerous biographical and historical books. At his death he had completed one volume of his *History of the Civil War in the United States* (1863).

SCHMUCKER, Samuel Simon, American Lutheran theologian: b. Hagerstown, Md., Feb. 28, 1799; d. July 26, 1873. A graduate of the University of Pennsylvania and Princeton Theological Seminary, he was long a leader of the Lutheran General Synod. As a liberal he opposed the conservatism of the mid-19th century German immigrants, supporting "American" as against "Old" Lutheranism. He published 44 works.

SCHNABEL, shnä'bĕl, **Artur,** Austrian pianist and composer: b. Lipnik, Austria, April 17, 1882; d. Axenstein, Switzerland, Aug. 15, 1951. Schnabel was recognized for his knowledge and interpretation of the works of Beethoven, having recorded every piano concerto and sonata of that great master. At the age of seven he began to study piano; in 1919 he was given an honorary professorship by German governmental decree. His first visit to the United States in 1922 was not a marked success. He returned in 1930 and 1933 and was exceptionally well received. Subsequently he toured the United States many times, his last appearance being in January 1951. Schnabel also toured Egypt and Palestine (1935), Australia (1939), and lectured at the universities of Chicago (1940 and 1945), and Michigan (1943). Aside from the versatility of his piano interpretations of the great masters he was well known for his compositions which included three symphonies, five string quartets, a piano concerto, a violin sonata, and other piano pieces. He also wrote two books: *Reflections on Music* (1936); and the *Line of Most Resistance* (1942).

SCHNAUZER, shnou'zẽr, a dog of the terrier breed which originated in Germany at least 500 years ago and which has remained unchanged in conformation since the earliest recorded description. The Schnauzer is a heavy-set dog, well boned and muscular. The head is fairly long with small V-shaped ears, heavy eyebrows, mustache and beard, and a dense wiry coat, growing against the grain on the back. Color: pepper-and-salt, pure black, or black and tan. There are three varieties of Schnauzer: the miniature, the standard, and the giant. The Schnau-

zer standard is 18 to 20 inches for males and 17 to 19 for females; the miniature Schnauzer should be from 11½ to 13½ inches. Some authorities believe the Schnauzer to be a cross between the Spitz and the Dog of Bologne.

SCHNEIDER, shnī'dėr, **Charles Conrad,** American engineer: b. Apolda, Saxony, 24 April 1843; d. 8 Jan. 1916. He was graduated at the Royal Technical School, Chemnitz, Germany, in 1864, came to the United States in 1897 and engaged in locomotive and bridge construction. He was vice-president of the American Bridge Company in 1900–03 and in 1911 became a member of the board of engineers for the Quebec bridge. Among the many bridges he designed and built are the cantilever Fraser River bridge on the Canadian Pacific Railway, and the Niagara cantilever bridge. In 1905 he was president of the American Society of Civil Engineers. Author of 'General Specifications for Railroad Bridges' (1886); 'General Specifications for Highway Bridges' (1901); 'General Specifications for Structural Steel Work in Buildings' (1905; new ed., 1910).

SCHNEIDER PROCESS OF ARMOR PLATE. See Armor Plate.

SCHNITZER, shnĭt'sĕr, **Edward.** See Emin Pasha.

SCHNITZLER, Arthur, Austrian dramatist and novelist: b. Vienna, 15 May 1862 (the son of the well-known laryngologist, Professor Johann Schnitzler, (1835–93); d. Vienna, 21 Oct. 1931. He studied medicine at the University of Vienna, receiving his degree in 1885, was interne in the Vienna General Hospital from 1886 to 1888, and then became an assistant at the Vienna Polyclinic as well as a private general practitioner. In judging the general tone, style and choice of subject of the Viennese writers of Schnitzler's generation it is important to remember that they differ from their Berlin contemporaries in that the former are more affiliated, in the emulation of their models, with French and Italian writers, while the latter incline more to an imitation of the Russians and Scandinavians. This means greater perfection of form and style among the Viennese, greater depth of treatment and recognition of the social milieu among the Berliners. Schnitzler and Gerhart Hauptmann may well be regarded as typical representatives of their respective cities in the same generation. 'Anatol' (Berlin 1892), Schnitzler's first publication, was typical of almost all his later work. It was a series of seven dramatic scenes, each depicting, in delicate psychological treatment, a different phase in the rather frivolous love-life of the hero. 'Liebelei' (1896) is a drama depicting love in a more tragic aspect. 'Der grüne Kakadu' (1899), was played by Mrs. Fiske in New York as 'The Green Cockatoo,' as a «curtain-raiser» to Hauptmann's 'Hannele'; it was a one-act play of powerful dramatic construction, dealing with a superficial episode of the French Revolution. His later plays became more mystical and resigned in tendency, although the erotic undercurrent is absent only in one play ('Professor Bernhardi,' see below): 'Paracelsus' (1899), 'Der Schleier der Beatrice' (1901), 'Lebendige Stunden' (1902), 'Der einsame Weg' (1903), 'Der Ruf des Lebens' (1905), 'Comtesse Mizzi' (1909), 'Der junge Medardus' (1910), 'Das weite Land' (1911). 'Professor Bernhardi' (1913) is a serious comedy, a satirical presentation of Austrian political intrigue, in which great issues are made to depend on trifling happenings. Only one female character appears in the play, a hospital nurse, who drops from view as soon as she has started the mischief. The treatment of anti-Semitic tendencies in ousting a Jewish hospital-director from his position because he has come into conflict with the interests of the ruling church receives added interest from the fact that Schnitzler was himself by birth a Jew and by training a physician, and it was not unlikely that the subject was taken from one of his own experiences. In 1915 Schnitzler published 'Komödie der Worte,' three one-act plays, in which he showed, by again resorting to erotic subjects, that the war in Europe has not always been successful in turning men's minds to serious topics. Among the best short stories were 'Sterben' (1895), 'Die Frau des Weisen' (1898), 'Leutnant Gustl' (1901), 'Die griechische Tänzerin' (1904), 'Der Tod des Junggesellen.' There were also two longer narratives (the second a long novel): 'Frau Bertha Garlan' (1901), 'Der Weg ins Freie' (1908). Later works are 'Casanova's Homecoming' (tr. 1921 and 1930), 'Dr. Graesler' (New York 1921), 'Road to the Open' (New York 1923), 'The Shepherd's Pipe' (New York 1923), 'Beatrice' (New York 1926), 'Fraulein Else' (New York 1925), 'None but the Brave' (New York 1926), 'Rhapsody' (New York 1927), 'Lonely Way' (Boston 1922). Schnitzler's collected dramas have appeared at Berlin (1910, 4 vols.), as well as the collected narratives (1910, 3 vols.). (See Anatol). A translation of the one-act play 'Literature' will be found in 'The German Classics of the 19th and 20th Centuries' (New York 1914), and a number of other plays have been translated by Edwin Björkman. Consult Hartmann, J. W., 'Schnitzler's Vienna' (*The New Review*, New York, January 1916); Pollard, Percival, 'Masks and Minstrels of New Germany' (Boston 1911); Salkind, Alexander, 'Arthur Schnitzler' (Leipzig 1907); Ratislaw, J. K., 'Arthur Schnitzler' (Hamburg 1911); Kapp, Julius, 'Arthur Schnitzler' (Leipzig 1912).

Jacob Wittmer Hartmann,
Late Head of the Department of German, Long Island University, New York.

SCHNORR VON KAROLSFELD, shnōr fōn kär-ōls-fĕlt, **Julius,** German painter: b. Leipzig, 26 March 1794; d. Dresden, 24 May 1872. His father was a painter and initiated him into the rudiments of art. In 1811 he proceeded to Vienna, and while there produced several works. In 1817 he visited Italy, spent a year at Florence and then took up his residence at Rome. Here he attached himself to the «Nazarenes,» then under the leadership of Cornelius and Overbeck. His painting 'The Wedding in Cana' attracted so much notice that he was chosen, along with the two painters already named, to paint the walls of the Villa Massimi at Rome. Among other works produced by him at Rome are 'Jacob and Rachel'; 'Ruth and Boaz'; 'The Flight into Egypt,' and 'Children brought to Jesus.' He removed to Munich in 1827, and was appointed professor of historical painting in the Academy of

Fine Arts there. He was next commissioned to decorate the new palace with frescoes of scenes from the national poem of the 'Nibelungenlied'; and adorn the Festsaalbau with incidents in the lives of Charlemagne, Frederick Barbarossa and Rudolf of Hapsburg. These are perhaps the most popular of modern works in fresco in Munich. In 1846 he became director of the picture gallery and professor at the Academy of Fine Arts in Dresden. While here he completed his illustrations of the Bible, 'Die Bibel in Bildern' (1852–60). They exhibit wonderful animation, variety and power. To the Dresden period also belong the oil-painting of 'Luther at the Diet of Worms,' and the designs for a window for Saint Paul's, London, representing scenes from the life of Saint Paul.

SCHODDE, George Henry, American scholar: b. Allegheny, Pa., 15 April 1854; d. 15 Sept. 1917. He was graduated from Capital University 1872 and from Leipzig University 1877, was professor of Greek and theology at Capital University, Columbus, Ohio, from 1880, editor of *The Lutheran Standard* from 1880 and of *The Theological Magazine* from 1897. He was also a contributor to the *Independent*, the *Sunday School Times* and a large list of church periodicals. He published 'The Protestant Church in Germany' (1903); and translated 'The Book of Enoch' and 'The Book of Jubilees,' from the Ethiopic, and 'Day in Capernaum' from the German of Delitzsch, Weiss' 'Religion of the New Testament' (1905). Weiss' 'Commentary on the New Testament' (4 vols. 1906), etc.

SCHOEBORN, shė'bôrn, **August,** American architect: b. Germany, about 1827; d. Washington, D. C., 25 Jan. 1902. He came to Wisconsin in 1849, but later removed to Washington, D. C., where until his death he was a member of the staff of the architect of the Capitol. In Civil War time he drafted plans of barracks, hospitals and forts for the quartermaster-general's department, and maps and plans for the use of General McDowell.

SCHOEFFER, shėf'fėr, **Peter,** German printer: b. Gernsheim, near Mainz, about 1430; d. about 1502. At about the age of 20 he was a student at the University of Paris, and a copyist. It seems likely that Gutenberg taught him what he knew of printing and employed him in his establishment at Mainz. After Fust and Gutenberg dissolved partnership Schoeffer was connected with the former, and the two names are associated on the imprint of the 'Book of Psalms,' printed in 1457. The reputation of his being the inventor of matrices and the typemold got abroad during his lifetime and was aided by his own artful insinuations; but modern research has disproved his claim to the work done by Gutenberg. He followed the career of printer after the death of his partner, Fust, and issued many works alone. He was succeeded by three sons who became eminent printers. Consult De Vinne, 'The Invention of Printing' (1876).

SCHOENECK, shėn'ėk, **Edward,** American lawyer: b. Syracuse, N. Y., 1 Aug. 1875. He studied law at Syracuse University and was admitted to the bar in 1903. In 1902 he became a member of the board of supervisors of Onondaga County, was a member of the New York assembly, 1904–07 and mayor of Syracuse, 1910–13. He was elected lieutenant-governor of New York 1915–16 and 1917–18.

SCHOENFELD, Hermann, professor: b. Oppeln, Germany, 21 Jan. 1861; d. 4 July 1926. He was educated in the universities of Berlin, Breslau and Leipzig, and in 1888 accepted a call as instructor in modern languages at Providence, R. I., and later at New Bedford, Mass. In 1891 he was appointed to Johns Hopkins University; in 1893 sent by President Cleveland as consul at Riga, Russia, and delegated by the United States Bureau of Education to investigate higher education in Russian, Austrian and Prussian Poland. Served as Ottoman consul-general at Washington, 1899–1910. After October 1894 he was professor of Germanics at Columbian (now George Washington) University. Dr. Schoenfeld was a contributor to many German and American magazines and encyclopedias, including THE ENCYCLOPEDIA AMERICANA. He published 'Brant and Erasmus' (1892); 'Erasmus and Rabelais' (1893); 'Higher Education in Poland' (1896); 'German Historical Prose' (1896); Leopold von Ranke' (1899); 'Treitschke'; he edited Schiller's 'Maria Stuart' (1899) and 'Wilhelm Tell' (1902); Bismarck's 'Orations and Letters' (1905); 'History of Teutonic Women, and Slavic Women' (1906); 'Essays on Universal Peace and German Armaments' (1913); 'Causes of the European Conflagration' (1914–15). From 1914 he also contributed extensively to journalistic literature on contemporaneous European history, especially of the Slavs and the Near East.

SCHOENLEBER, shėn'lā-bėr, **Gustav,** German painter: b. Bietigheim, Würtemberg, 3 Dec. 1851. He studied under Kurtz in Stuttgart and Adolf Lier in Munich, and traveled in Italy and Holland, in the latter country especially finding congenial themes for his landscape art. He reproduced the tender tints of the flat, moist land with now and then a church steeple or a clump of trees as a diversifying feature. In 1880 he was made professor at Carlsruhe. Among his works are 'Harbor of Genoa' at Rotterdam; 'Venetian Fishing Boats' at Hamburg Gallery; 'View of Flushing at Low Tide' (1881), Dresden Museum; 'Evening near Dordrecht,' Stuttgart Museum. He died in 1917.

SCHOENN, shėn, **Aloys,** Austrian artist: b. Vienna, 11 March 1826; d. Krumpendorf, 16 Sept. 1897. He studied at the Vienna Academy under Führich and Leander Russ. He served through the Italian campaign of 1848 and fought in the Hungarian war. During 1850–51 he studied at Paris, and then traveled in the East. His field is genre. Some of his works are 'Evening on the Nile'; 'Departure of Tyrolese Students from Vienna in 1848'; 'Storming of Ladrone,' 'On the Coast of Genoa,' 'Goose Market at Cracow,' at Vienna; 'Scene in Persecution of Jews'; 'Festival in Capri'; 'Fish Market at Chioggia'; 'Market in Bosnia'; 'Market in Tunis.'

SCHOFIELD, skō'fēld, **John McAllister,** American military officer: b. Gerry, N. Y., 29 Sept. 1831; d. Saint Augustine, Fla., 4 March 1906. He was graduated from West Point in 1853, and assigned to garrison duty in South Carolina and Florida. In 1855–60 he was assistant professor of philosophy at West Point, and was professor of physics in Washington

University, Saint Louis, Mo., in 1860–1861. He acted as mustering officer for the State of Missouri at the outbreak of the Civil War, served on the staff of General Lyon in the Missouri campaign and in November 1861 was appointed brigadier general of volunteers. He was in command of the District of Missouri in 1861–1862, of a division in the Army of the Cumberland in 1863, and again commanded the Department of Missouri in 1863–1864. In 1864–1865 he commanded the Department of the Ohio, was engaged in the Atlanta campaign and commanded at the battle of Franklin, Tenn., in 1864, receiving rank as brigadier general and brevet major general in the regular army in recognition of his services. He continued in the army after the war, was secretary of war in 1868–1869, and commanded various departments until 1888 when he was assigned to the command of the army of the United States as senior major general. In 1895 he was promoted lieutenant general, a grade created for him, and later in the same year he was retired. He published *Forty-six Years in the Army* (1897).

SCHOFIELD, Walter Elmer, American artist: b. Philadelphia, Pa., Sept. 9, 1867. He studied at the Academy of Fine Arts, Philadelphia, and in Paris under Bougereau, Edmond Aman-Jean, Ferrier and Doucet. During a three years' residence at St. Ives he specialized independently in landscape work and notable examples are *Morning* and *Midwinter Thaw* in the Cincinnati Museum, *Across the River* in the Carnegie Institute, Pittsburgh, *Morning after Snow* in the Corcoran Art Gallery, Washington, and *Sand Dunes Near Lelant* in the Metropolitan Museum, New York.

He received many medals and honor awards and was elected National Academician in 1907. In 1915 he enlisted in the British army and received advancement to captain of artillery. He received the Altman Prize in 1920.

SCHOFIELD, William Henry, American educator: b. Brockville, Ontario, April 6, 1870; d. June 24, 1920; graduated at the University of Toronto, 1889, took his Ph.D. at Harvard in 1895, studied at Paris, Christiania and Copenhagen in 1895–1897. He was master of modern languages at Collegiate Institute, Hamilton, Ontario, in 1889–1892. From 1897 he was connected with the faculty at Harvard, and from 1906 he was professor and head of the department of comparative literature there. He was Harvard exchange professor at Berlin in 1907–1908; and was lecturer at the Sorbonne, Paris, and at the University of Copenhagen in 1911.

He was editor in chief of *Harvard Studies in Comparative Literature.* Author of *Studies on the Libeaus Desconus* (1895); *The Home of Eddic Poems* (1899); *English Literature from the Norman Conquest to Chaucer* (1905); *Chivalry in English Literature* (1912); *A Blind Bard from Faery* (1918); and *Life of William Wallace* (1918).

SCHOHARIE, skō-hăr'ĭ, town and village, New York, Schoharie County seat; altitude 611 feet; 37 miles west of Albany. Its industries are dairying, farming, cultivation of nursery stock, stone quarrying, and plastic products.

Old Stone Fort, erected in 1772 as a Dutch Reformed Church, was stockaded for valley defense in 1777, and figured in the revolution. It is now maintained as a county museum. Pop. (1950), town, 2,794; village, 1,063.

SCHOHARIE CREEK, New York, rises in Greene County, and flows 85 miles east and north to the Mohawk River.

SCHOHARIE GRIT, a more or less silicious and calcareous shale, or a silicious limestone typically found in the Schoharie Valley of eastern New York, from which it takes its name. It is intimately associated with the overlying Onondaga limestone of New York, with which together it forms the Ulsterian subgroup of the Mid-Devonic group. At its type location it is not over six feet thick and richly fossiliferous. In the Hudson Valley it is a shale, almost barren and sometimes 100 feet or more in thickness.

SCHOLAR-GIPSY, The, and **THYRSIS.** Matthew Arnold's pastoral idyls, *The Scholar-Gipsy* (1853) and *Thyrsis* (1866) are linked by internal references and, like *L'Allegro* and *Il Penseroso* by similarities of form, mood, scene and theme, both being interpretations of the sentiment of the Cumner country near Oxford as felt by a poetic spirit somewhat ill at ease amid the distractions of his century. The earlier poem was suggested by an incident related in Glanvil's *Vanity of Dogmatizing* (1661) of an Oxford lad who had joined a band of gypsies and had acquired from them a secret for working wonders through the power of imagination. Arnold makes this lad a symbol of the simple-hearted idealism of an elder day, and feigns that his shy spirit still haunts the Cumner hills and appears to shepherds and reapers and village maidens dancing around the Fyfield elm in May—his hands filled with "dark bluebells drench'd with dews of summer eves." Apostrophizing this charming genius loci, the poet bids him shun the feverish contact of men infected with "this strange disease of modern life, with its sick hurry, its divided aims, its heads o'ertax'd, its palsied hearts." *Thyrsis,* the only rival in English to *Lycidas* and *Adonais,* was written ostensibly to commemorate the author's friend, Arthur Hugh Clough, who had died at Florence in 1861; but there is not very much of Clough in the piece. What Arnold really commemorates is the emotion excited by the pastoral loveliness of the scenes in which he and his brother poet, a companion of his college days, spent their dreaming youth, as yet untroubled by the contentions of the workaday world, still pursuing the gleam of a poetic imagination, still free to wander like Sicilian shepherds through "many a dingle on the loved hillside." With one exquisite image after another Arnold evokes the feeling of early spring, the fragrance of whitening hedges, the cuckoo's parting cry, the rapture of young blood in June when the high midsummer pomps come on:

> "Roses that down the valleys shine afar,
> And open jasmine-muffled lattices,
> And groups under the dreaming garden-trees
> And the full moon, and the white evening-star."

Death and the call of the busy world ended this Theocritean holiday and harshened and silenced the music of these young singers, but by the magic of these two poems Arnold and Clough and the nameless Oxford lad will be associated forever, in the minds of all lovers of poetry, with the romance of the "home of lost causes" and the enchantment of the Eng-

lish spring. For periodical criticisms consult Smart, T. B., 'Bibliography of Matthew Arnold' (1892); books on Arnold by Saintsbury, George (1899); Paul, H. D. (1902); Russell, G. W. E. (1904); Dawson, W. H. (1904); Dixon, J. M. (1906); Sherman, S. P. (1917).

STUART P. SHERMAN.

SCHOLASTICISM (Lat. *schola*, "school"). Scholasticism is the philosophy of the "Schools." Charlemagne (742–814), inviting leading scholars of the Church to his court, established a Palatine School and a series of cloister and diocesan schools throughout his empire, and out of these as the mediæval centres of learning arose the scholastic philosophy. The term "scholastic" (Doctor Scholasticus) was applied not only to teachers of the seven liberal arts in these Carolingian institutions and the later established seats of learning, but also to teachers of theology and philosophy. The term gradually became narrowed to denote the latter class. The movement extends from 850 to 1453 A.D. and may be divided into two periods: (1) 850–1200, that is, from Johannes Scotus (or Erigena) to John of Salisbury and the Arabs; (2) 1200–1453, that is, from Alexander of Hales to the fall of Constantinople and the rise of Humanism. The first period is characterized by the controversy on the subject of universals. The second period is marked by the fusion of Aristotelianism with dogmatic theology, the delimitation of the spheres of faith and reason and the controversy regarding the primacy of the will over the intellect. In the first period the chief figures are Johannes Scotus, also called Erigena (that is, Irish-born, b. 810, d. 877, the earliest notable scholastic, fused Neo-Platonism with Christian theology, Gerbert (c. 1003 as Pope Sylvester II and distinguished for investigations in mathematics and natural science), Roscellinus (b. 1050, originator of Nominalism), Peter Lombard (d. 1164 as bishop of Paris, writer of the famous 'Sentences'), William of Champeaux (1070–1121, champion of realism against Abelard), Anselm of Canterbury (1013–1109, constructed an ontological argument for the existence of God), Abelard (1079–1142, originator of Conceptualism), John of Salisbury (1110–80, beginnings of reactionary attitude toward the one-sided scholastic culture). To the second period belong chiefly the following: Alexander of Hales (d. 1245, one of the originators of the 'Summa,' a sort of encyclopedia of theology and natural science, that attained vogue in this period), Bonaventura (1221–74, mystic), Albertus Magnus (Count of Bollstädt, 1193–1280, the most learned man of his age in the natural sciences), Thomas Aquinas (1225–74, fused Aristotelianism with Christian theology), Duns Scotus (1274–1308, advocate of the primacy of the will against the Determinism of the Thomists), William of Occam (1270–1347, important Nominalist and opponent of the temporal power of the papacy). The early schoolmen possessed among other works a meagre part of the logical treatises of Aristotle, Plato's Timæus, the writings of Boethius, Cicero, Seneca, Augustine, Martianus Capella and Pseudo-Dionysius the Areopagite. The latter schoolmen possessed the whole body of Aristotelian writings, and the works of the Arabs and Jews. One of the fundamental characteristics of the scholastic period is the subservience of philosophy to theology. Philosophy is under the rigid censorship of the Church and although the intrinsic spirit of scholastic philosophy may not be that of a "handmaid to theology" (*ancilla theologiæ*), yet ecclesiastical authority reduces it practically to that position. Its real spirit is no doubt the desire to harmonize rational and revealed truth, and not to diminish the claims of reason. Nevertheless, its historical function was not so much the discovery of truth, as the defense of dogma. The service demanded of philosophy is apologetic and, therefore, the discipline of logic is particularly important and widely studied. Knowledge is subordinated to faith. In the scholastic era the Church was the bearer both of science and religion, but as the interests of the latter were the primary concern of the Church and in its estimation the most important for man, the subordination of science to theology was, from the Church's viewpoint, both legitimate and necessary. Gradually, however, science and philosophy asserted their independent claims, and in the Renaissance, the rebirth of the Greek spirit and of the dignity and worth of profane culture,— reason assumed a distinctive position for itself. The result was a long warfare between science and theology, between reason and creed. Although scholasticism was a combination of Hellenic thought with the Church dogmas, yet the rationalistic spirit of Greek philosophy remained practically dormant during the entire scholastic period and did not really awake until the rise of Humanism. The most important question for early scholasticism was the ontological significance of logical genera or universals. In this controversy the scholastics split into two great parties, the realists and nominalists.

Realism is the doctrine that genera and species have existential reality, that is, they are entities, and extreme realists regarded such universals as existing apart from and independent of particulars. The formula for the extreme realists is that universals exist *ante rem* ("before the particular," Platonism); of the moderate realists that they exist *in re* ("in the particular," Aristotelianism). The extreme opposition was formed by the nominalists who maintained that universals or genera are only class names and have no existence apart from the name. A middle party was formed by the conceptualists or sermonists, who maintained that universals are concepts and have ideal existence as notions in the mind, or, as Abelard more specifically held, the word becomes universal by means of predication. The formula for nominalism and conceptualism is that universals exist *post rem* (after the particular"). These discussions of the Middle Ages were powerless to advance knowledge, being mainly exercises in abstract dialectic, although carried on with great subtlety and genius in logical analysis. The question acquired, however, an important bearing by involving the doctrine of the Trinity and the existence of God. According to the realists the greater the universality, the greater the reality; the wider the concept the more extensive its being. God, as the most universal notion, has the most complete reality; as *ens generalissimum* He is *ens realissimum*. Further, the nominalists regarded as real only the individual, concrete thing. The realists urged against this that according to nominalism,

only the three persons (as individuals) of the Trinity have reality; therefore there is no Godhead and we have tritheism. Anselm maintained that the universals existed before particular things in the mind of God. The most memorable controversy on the subject took place in Paris between William of Champeaux and Abelard, in which the latter gained a dialectic victory.

Scholasticism reached its complete formulation in Thomas Aquinas who developed a system of philosophy by the fusion of Aristotelianism with Christian theology, and who sought to correlate more precisely than his predecessors the spheres of faith and reason. Reality and truth are one continuous realm, although certain truths transcend reason and are apprehended only by faith. Faith and revelation do not contradict reason; they transcend it.

An absorbing question for the late scholastics was the psychological question of whether primacy belongs to the will or to the intellect. Does the will determine our ideas, or do out ideas determine the will? Thomas Aquinas was a determinist, while John Duns Scotus represented the voluntarists. Is it the will or the intellect which is decisive in determining character? On the side of the primacy of the intellect were arranged Thomas Aquinas, the medieval Aristotelians, the German mystics, and the Dominicans; while on the side of the will were Duns Scotus, the Augustinians, William of Occam, and the Franciscans. On the question of universals, Aquinas and Duns Scotus took similar ground, namely, that of moderate realism. Both maintained that the universals exist in the mind of God (*ante rem*) as ideas before creation, substantially and immanently in things (*in re*), and as notions and names employed by the individual mind (*post rem*).

The philosophy of the Arabs during the scholastic era is essentially Aristotelianism combined with elements of neo-Platonism (the emanation theory). Their interest was mainly in medicine, natural science, and mathematics. The chief Arabic philosophers were al-Farabi (870?–950), Avicenna (980–1037), al-Ghazali (or Algazel, 1058–1111), and Averroës (1126–1198). They were important as the carriers of Aristotelianism and the seeds of natural science into Europe through Spain. The Jewish philosophy of the scholastic period is partly the cabala (a secret emanistic philosophy recorded in the works of Jezirah and Sohar) and Aristotelianism. The most important figure, however, was Maimonides (Rabbi Moses ben Maimon, 1135–1204) who combined the sublunary philosophy of Aristotle with Hebrew theology.

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SCHOLIUM, skō'lĭ-ŭm, an explanatory or critical note made by an early grammarian or copyist on the margin of Greek or Latin classical manuscript. Scholia of Venetian origin on Homer's *Iliad* are among the most important to have been discovered. Most of the scholiasts have remained anonymous.

SCHOMBERG, shôm'bĕrk, **Friedrich Hermann,** 1st Duke of, German professional soldier: b. Heidelberg, 1615?; d. Battle of the Boyne, Ireland, July 12, 1690. Educated at Sedan, Paris, and Leiden, he served under Prince Frederick Henry of Orange (1633) in the Thirty Years' War, and subsequently with the Swedish Army in Germany (1634), the Dutch Army (1639–1650), the French Army (after 1650), and the Portuguese Army (1660–1668). He was naturalized in France in 1668 and became a French marshal in 1675. Forced to leave France in 1685 because of his Protestant faith, he became governor of the duchy of Prussia and commander in chief of the Brandenburg Army (1687). In 1688 he went to England with William III of Orange; there he was naturalized and created a duke in 1689, and was given command of English forces in Ireland against James II (1689–1690), winning his greatest and final victory at the Battle of the Boyne.

SCHOMBURGK, shŏm'bûrk, Sir **Robert Hermann,** British explorer: b. Freiburg, Silesia, June 5, 1804; d. Schöneberg, near Berlin, March 11, 1865. After visiting the United States (1829) and surveying the island of Anegada in the Virgin Islands (1830), he led an expedition to British Guiana for the Royal Geographical Society in 1835 and there discovered the *Victoria regia* water lily, described in his *Description of British Guiana* (1840) and *Views in the Interior of Guiana* (1841). Returning to British Guiana with his brother, Moritz Richard, in 1840–1844, he surveyed the country's boundaries with Venezuela and Brazil, establishing the so-called "Schomburgk Line." He was knighted in 1844, and became British consul in Santo Domingo (1848) and Bangkok (1857–1864).

SCHÖNBEIN, shûn'bīn, **Christian Friedrich,** German chemist: b. Metzingen, Oct. 18, 1799; d. Sauersberg, near Baden Baden, Aug. 29, 1868. He studied at Tübingen and Erlangen universities, visited England and Paris, and taught chemistry and physics at various universities before becoming a lecturer at the University of Basel in 1828 and professor after 1835. He is best known as the discoverer of ozone (1839) and as the first to produce guncotton (1845), from which he obtained collodion (1846). His works include *Das Verhalten des Eisens zum Sauerstoff* (1837), *Beiträge zur physikalischen Chemie* (1884), *Ueber die Erzeugung des Ozons* (1844), and *Ueber die Verbrennung der Körper in atmosphärischer Luft* (1845).

SCHÖNBERG, shûn'bĕrk, **Arnold,** Austrian-American composer: b. Vienna, Sept. 13, 1874; d. Brentwood, Calif., July 13, 1951. At the age of eight, Schönberg began studying the violin in Vienna, and later he taught himself the 'cello, playing with amateur groups for which he composed chamber music. He soon came to the attention of the Viennese composer and teacher, Alexander von Zemlinsky, who taught him counterpoint and engaged him to play the 'cello in the Polyhymnia Orchestra. In 1899 he composed his first important work, the tone poem, *Verklärte Nacht* (*Transfigured Night*), a sextet for strings.

After his marriage to Mathilde von Zemlinsky (who died in 1923) he moved to Berlin in 1901, where, through the influence of Richard Strauss, he obtained a position as teacher of composition at the Stern Conservatory. During this time he virtually completed *Gurre-Lieder* (*Songs of the Dove*) for which the orchestration was not finished until 1911. Returning to Vienna in 1903, he taught harmony and composition and about this time met Gustav Mahler, through whose influence several of his works were given performance. In 1911 he completed his important text, *Harmonielehre* (*Theory of Harmony*), dedicated to Mahler's memory.

Schönberg's early compositions, influenced by Wagner, Brahms, and Mahler, had been of romantic vein and traditional in form. From about 1907 his works, including the famous *Pierrot Lunaire* (1912), showed increasing elements of expressionism, such as the whole-tone scale, in a complex contrapuntal texture. By 1915 he began to experiment fully with the 12-tone system to achieve logic and unity in his music without recourse to traditional methods.

Leaving Vienna again in 1911 because of hostility toward his works, Schönberg returned to Berlin, becoming an instructor of composition at the Akademie für Kunst, and lecturer on aesthetics at the Stern Conservatory. He conducted his own works in Amsterdam (1911), St. Petersburg (1912), and London (1914), gaining international recognition, as well as evoking opposition. Following periods of military service with the Austrian Army in 1915–1917, he returned to teaching composition in Mödling, near Vienna, lectured on theory in Amsterdam (1920–1921), was married to Gertrud Kolisch in 1924, and in 1925 was appointed to a professorship at the Prussian Academy of Arts in Berlin. He held this post until his dismissal by the Nazi government in 1933 because of his Jewish descent. He then went to Paris, and from there to the United States in October 1933. After teaching at the Malkin Conservatory in Boston and at the University of California in Los Angeles, he accepted a professorship at the University of Southern California in 1936. He became a United States citizen in 1940. Although he retired in 1944, he continued to conduct classes privately. His *Style and Idea,* a collection of essays, was published in 1951.

Schönberg exerted a revolutionary influence on modern music by his abandonment of the traditional tonal system and his use of the 12-tone scale. His compositions, often discordant, raucous, and bewildering to the uninitiated, sometimes provoked audiences to storms of protest. At his death, however, few critics, whether sympathetic or hostile, would deny the significance of his contributions as composer, theorist, and teacher. Schönberg's principal works include:

CHAMBER MUSIC—*Verklärte Nacht,* sextet for strings (1899); string quartet in D minor (1907); *Kammersymphonie,* for 15 instruments (begun in 1906, performed in 1913); string quartet in F-sharp minor (1907); *Serenade* (1924); quintet for winds (1924); suite for seven instruments (1934); and two string quartets (1927 and 1936). ORCHESTRAL—*Peileas und Melisande* (1905); five pieces for orchestra: *Vorgefühl, Vergangenes, Der Wechselnde Akkord, Peripatetik,* and *Das Obligato Recitativ* (1912); *Pierrot Lunaire,* melodrama for recitation and chamber orchestra (1912); *Variations* (1928); concerto for string quartet and orchestra (1933); suite for string orchestra (1934); *Kammersymphonie,* for large orchestra (first performed in 1935, second work performed in 1940); concerto for violin and orchestra (1936); *Ode to Napoleon,* for reciting voice, piano, and string orchestra (1942); concerto for piano and orchestra (1942–1943); *Theme and Variations* (1943). OPERAS—*Erwartung,* monodrama (1909); *Die glückliche Hand,* drama with music (1913); *Von Heute auf Morgen,* one-act opera (1929). CHORAL MUSIC—*Gurre-Lieder* (1911); *A Survivor from Warsaw,* for narrator, male chorus, and orchestra (1947).

SCHONEBECK, shû'nĕ-bĕk (in full SCHÖNEBECK-BAD SALZELMEN), city, East Germany, on the Elbe River, is about ten miles south of Magdeburg and some 55 miles northwest of Leipzig on the rail line that connects those two cities. It falls within the boundaries of the state of Saxony-Anhalt. The present city limits were fixed in 1932 on the incorporation of the former commune of Frohse an der Elbe with the old towns of Schönebeck and Salzelmen. At that time the popular spa area known as Bad Salzelmen became part of the southwestern sector of the city. At the beginning of World War II, Schönebeck's industries included salt mining, metal works, and the manufacture of chemicals, explosives, and other strategic goods, all of these activities being served by an excellent harbor. Not surprisingly, the city became a major target of Allied bombers and suffered heavy damage. Pop. (1946) 44,578.

SCHONEFELD, shûn'ĕ-fĕlt, **Henry,** American musician: b. Milwaukee, Wisconsin, Oct. 4, 1857; d. Los Angeles, California, Aug. 4, 1936. He studied in Leipzig (1875–1878) and Weimar (1878–1879) before becoming engaged in teaching, composing, and conducting in Chicago and, after 1904, in Los Angeles. He was one of the first to use Indian folk melodies. His compositions include symphonies, an opera, and numerous works for strings, piano, and voice.

SCHONEMANN, shû'nĕ-män, **Anna Elisabeth,** German woman, celebrated by the poet Johann Wolfgang von Goethe under the name LILI: b. Frankfurt am Main, Germany, June 23, 1758; d. May 6, 1817. As a young man of 25, Goethe met Anna, the daughter of a wealthy banker's widow, at Frankfurt and became engaged to her early in 1775. His excellent love lyrics of that year were inspired by this girl, whose liveliness and beauty attracted him tremendously. A discordant note existed from the beginning, however, in the moody poet's discomfort when caught up in the gay, somewhat superficial social life of Frankfurt society, "Lili's" natural milieu. The engagement was broken sometime before Goethe's departure for Weimar in November of 1775. Anna later married a Strasbourg banker, Bernhard Friedrich von Türckheim.

SCHONER, shû'nĕr, **Johannes,** German mathematician and geographer; b. Karlstadt, Germany, 1477; d. Nürnberg, Jan. 16, 1547. He was a professor of mathematics at the University of Nürnberg but is best remembered as a maker of terrestrial globes. Only two of these are known, one made in 1515 and the other in 1520, but both showed a continent named America and the earlier globe may have been the first on which this name appeared. They also showed a strait at the southern end of the continent, probably a fortunate guess since Magellan's discovery occurred in the fall of 1520 and the account of his voyage could not have been reported to Schöner before 1522.

SCHONGAUER, shōn'gou-ĕr, **Martin** (also known as MARTIN SCHÖN and HIPSCH or HÜBSCH MARTIN), German engraver and painter:

b. Colmar, Alsace, 1445?; d. Breisach, 1491. The son of an Augsburg goldsmith, his earliest known works were two drawings, dated 1469. He was influenced by the Flemish painter, Roger van der Weyden, whose bright coloring and angular modeling are reflected in the few paintings which can, with any degree of certainty, he attributed to Schongauer. Among these are the renowned *Madonna of the Rosehedge* (Church of St. Martin, Colmar); *The Adoration of the Shepherds* (Berlin); and his representation of the Virgin and Child, Saint Anthony, and a donor in two wing panels of an altarpiece now at Berlin.

Schongauer is perhaps best remembered as an engraver, having been among the first to cut copper plates for reproduction. He always portrayed his religious subjects with remarkable minuteness of detail. The more than 100 engravings attributed to him include series on *The Wise and Foolish Virgins, The Passion,* and *The Death and Coronation of the Virgin.* Specific engravings such as *The Adoration of the Magi, The Death of the Virgin,* and the diabolical *Temptation of Saint Anthony* are considered masterpieces. He was famous in Germany and Italy during his lifetime and founded, at Colmar, a school of engraving which produced many gifted artists of the late Gothic period.

SCHONHAUSEN, shûn-hou'zĕn (also SCHÖNHAUSEN AN DER ELBE), village, East Germany, near the Elbe River, about 35 miles north of Magdeburg. It was formerly in the Prussian province of Saxony and is now in the *land* (state) of Saxony-Anhalt. It is renowned chiefly as the family seat and birthplace of Prince Otto von Bismarck. A village of considerable antiquity, it can boast a 13th century church. Pop. (1946) 3,281.

SCHONHERR, shûn'hĕr, **Karl,** Austrian dramatist: b. Axams, Tirol, Feb. 24, 1869; d. Vienna, March 16, 1942. A physician as well as a playwright, his plays are frequently concerned with medical and peasant people of the Tirol. At the age of 26 he turned from writing poetry and short stories in Tirolese dialect to the theater, his plays subsequently winning the Schiller Prize in 1908 and the Grillparzer Prize in 1911, 1917, and 1920. His works include *Die Bildschnitzer* (1895); *Judas von Tirol* (1897, revised in 1927); *Erde* (1907); *Glaube und Heimat* (1910, Eng. tr., *Faith and Home,* 1913–1915); *Der Weibsteufel* (1915); *Volk in Not* (1916); *Es* (1923); *Die Hungerblockade* (1925); *Der Armendoktor* (1927); *Herr Doktor, haben Sie zu essen* (1930).

SCHONINGEN, shû'nĭng-ĕn, town, Germany. About 30 miles west of Magdeburg in northwest Germany, it was formerly part of Brunswick and is now in Lower Saxony. It has salt, rubber, and machine works, a 14th century castle, and a Romanesque-Gothic church. There was already a settlement here in 747 A.D. Pop. (1950) 15,583.

SCHOOL DISTRICT. See DISTRICT.

SCHOOL FOR SCANDAL, The, by Richand Brinsley Sheridan (q.v.), was produced May 8, 1777, by the author himself as manager and part owner of Drury Lane Theatre, which he had taken over some time before from David Garrick. Unlike the earlier *The Rivals* the play was an instant success. It ran 20 nights the first season, 65 nights the second season, and has held the stage ever since.

The School for Scandal, the only play of later date to challenge comparison with William Congreve, may be studied as an index of dramatic tendencies since the Restoration. The movement for correcting the morals of the stage, traces of which were seen in *The Way of the World,* have now culminated in a definite brand of technique. Though scandal is spoken in the play none is actually seen in the action. The polite subterfuges demanded by modern English taste have begun. The tradesman has been introduced into comedy. Moreover, though Sheridan ridicules sentiment, the primary action of the play revolves around a sentimental motive. Joseph Surface is a false sentimental hero, while Charles Surface is a true sentimental hero. Oliver and Rowley are characters from sentimental comedy.

The School for Scandal is of the school of Congreve once removed. Whereas Congreve conventionalizes life, Sheridan conventionalizes the stage. With Congreve, wit is the specific; with Sheridan it is entertainment. *The School for Scandal* is a crowded fabric of "situations" derived from a broad reading of English comedy and an intimate acquaintance with the stage. Much worked over in composition out of scattered scenes and different plays, the central idea of a school for scandal goes back to the cabal nights of Lady Wishfort in *The Way of the World.* Action has become more important than speech, and events follow each other in rapid succession. There is little repartee. The brilliancy of give and take gives way to broken monologues. Dialogue serves not as a fencing of wits but as the rapid patter of characters, manipulated through a foreordained intrigue. To keep the conversation running rapidly is the first requirement. Therefore a spirit of raillery is maintained.

When these things are said it must be admitted on the other side that the play occupies a significant position. It was the last of the comedies of manners and the first of the modern plays of entertainment. The former were written for the discriminating; the latter for the crowd. The plot is regular and expert in the handling of a crowded action. In theatrical "effects" the play has been a storehouse of devices for a century of writers of comedy. On account of its adjustment of old materials to the requirements of the new day the play has maintained vitality unabated to this day.

SCHOOL SUPERINTENDENT, The. The office of superintendent of schools is a unique American institution, evolving from a need to meet certain demands. The United States was the first nation to attempt provision of universal public education. The size and scope of the task dictated forms and kinds of organization and administration which were not needed to the same degree by other nations. These demands upon organization and administration finally led to the establishment of the office of the superintendent of schools.

Growing Schools and Communities.—America in the 17th and the early part of the 18th century was sparse in population and almost entirely lacking in transportation and communication facilities. For the most part people lived in isolated communities and there were no large cities. Schools, therefore, were small, housed mostly in

one- and two-room buildings. The program of the school was simple, the teaching of the rudiments of learning being the main task. Then, with the rise of the immigration rate, the beginnings of the Industrial Revolution, and the resulting complexities of the economy, the trend developed for people to live together in more closely knit communities. Individual schools became larger and the demands made upon them were more diverse.

The Superintendent of Schools Emerges.—By 1850 many schools had 10 or more classrooms in a building. An increasing number of communities found it necessary to have several buildings in order to house the growing school population. These conditions led to the need for someone to help the heretofore self-sufficient teacher, and also to perform tasks which applied to the entire school rather than to the individual classroom. School boards, as a result, began to add to the school staff a person who was assigned these tasks. Sometimes called a head teacher, later a building principal, this position finally evolved into the office of superintendent of schools. Buffalo, N. Y., and Louisville, Ky., in 1837 were the first two cities to establish this office.

Schools and Governmental Structure.—To understand the office of school superintendent, one has to understand the framework of governmental structure in the United States which is based upon the concept of three levels of government. All are interrelated and at the same time are largely separate from one another; all have a concern for education. At the federal level, the top official is the commissioner of education. He is appointed by the president and has few executive functions. The duties of his office are, primarily, those of leadership, service, and research. In turn, each state has a superintendent of schools (sometimes called state commissioner of education). As education has been held to be a state function, this officer, in most states, has many important responsibilities for the maintenance and operation of schools. The first state to create this office was New York in 1812.

The superintendent's position at the state level evolved from the function of statistics-gathering and reporting to the leading educational place in a state. By legislative enactments, he is charged with general supervisory control of all public schools in the state. In addition, many specific responsibilities are placed upon him: for example (1) certification of teachers; (2) recommendation of needed school legislation; (3) approval of plans for new school buildings. In the first half of the 20th century, emphasis was given to the regulatory or law enforcement aspects of the office. Since World War II, increasing emphasis has been laid upon leadership and research.

Within the state there are two types of school units, county and local district. The county as a unit of school organization is commonly found throughout the United States. Ordinarily, it is an intermediate unit between the state and the local community. Most counties have an officer called county superintendent of schools. In a majority of these counties, this official does not actually manage or operate schools directly. However, in 12 states (mostly in the South) the county is the only local unit for the operation of schools.

The main type of school unit is the local or community school district. The chief administrator of these districts is called the superintendent of schools. (In a few states, the title used is supervising principal. In a few instances, the term superintendent of education is used.)

Requirements for the Office.—The state superintendent of schools attains his office in various ways. In the majority of the states, he is elected by the people of the state. In several states, he is appointed by the governor. In still others, he receives his appointment from the state board of education. The last method is receiving increasing favor; it is the method of selection advocated by students of school administration.

County superintendents of schools are most frequently selected by popular vote. The method recommended is selection by a county board of education, a method increasingly used. Various other methods of selection are found infrequently.

Local superintendents of schools are almost universally selected by local boards of education.

The salaries of superintendents are generally fixed by the appointing school board. However, at the state level the salary is frequently set by legislative enactment. The term of office ranges from fixed terms, usually one to five years, to indefinite tenure at the pleasure of the appointing board. In most cases, superintendents are not eligible for legal tenure.

Requirements for appointment range from almost none to advanced university graduate work and successful experience. The most frequent requirements are graduation from college, experience as a teacher, and completion of certain specified college courses. That a superintendent must hold a state certificate, usually of the highest grade, has become an almost universal requirement. In some states, special superintendents' certificates are required.

The school superintendency has grown rapidly in America from its humble beginnings in the second quarter of the 19th century. The office is now found universally in every state, every county, and in the vast majority of local school districts (practically all having six or more teachers). It has attained status and is accepted as an essential part of a school system. The evolution of the scope of the office is even more noteworthy than its quantitative growth.

Evolving Duties of the Superintendent.—The superintendency began in simple fashion. Most of the tasks were clerical and designed to relieve teachers from a growing burden. Another task was disciplinary in nature: the unruly had to be made to obey. Someone had to meet the parents and discuss school problems with them. Thus, the office was created and began to operate. As the job progressed, additional tasks were added, among them being the care of the building, selection and purchase of supplies, and advice to teachers who needed it.

The real development of the superintendency, however, began in the first quarter of the 20th century. It was in this period that colleges and universities began to offer specific preparation for the office of school superintendent. Students increasingly were attracted to the position, and hence undertook the preparation offered. School boards began to consider preparation for the office in their selection practices. Thus began the professionalization of the position and its acceptance in the list of essential jobs in a school system.

With the beginnings of preparation for the office, reconsideration was given to the value of the position and the tasks which should be performed. Studies were made to determine what

superintendents actually accomplished, and thought was given to what they should do. The results have had an important bearing on the preparation programs for the position. Since the early 1900's there have been various emphases which have closely paralleled similar ones for industrial management. Among them are: the superintendent's role as a technician (for example, preparation for financial accounting); his role as a manager (preparation for organizing and operating school bus transportation); and his role of community and school leadership (understanding of group dynamics).

Transition to Democratic Practices.—The role of leadership has received major attention since World War II. In the early era of school administration, the superintendent of schools tended to operate by fiat. He was an authoritarian, and his decisions were made with little participation of others. Undoubtedly the methods of Prussian schoolmasters influenced this practice. Since World War II it has been increasingly recognized that a leadership role in a free society should be in harmony with the concepts of the meaning of a free society. Equality and the right of participation of all concerned in a given enterprise led to a sharing in policy making and planning. The trend affected the work of school superintendents—their preparation and their methods.

It was not easy, however, to make the transition from authoritarian to democratic practice. Prodigious efforts were required. The American Association of School Administrators brought its influence and efforts into action. Professors of school administration founded the National Conference of Professors of Educational Administration and accepted as a major activity the translation of the preparation of school administrators primarily into a democratic leadership conception. The work of these groups and others led the W. K. Kellogg Foundation to provide a grant which totaled almost $5 million to assist in improving school administration. Starting with a five-year program, superintendents and faculty personnel of universities attacked the problem. Results show definite progress toward more democracy in administration and toward the assumption of a greater role for superintendents as community leaders. The role has shifted from *things* to *people*. At the same time, the higher education institutions preparing superintendents have shifted their emphasis from the superintendent as a manager and a technician to the superintendent as a person who must know how to get along with people. The stress is on leadership and how it works.

Functions of a Superintendent of Schools.—The functions of a superintendent of schools are many and diverse. The superintendent of schools has a dual relationship to the local school board. First, he is the professional adviser to the board, counseling it on policies it should consider and adopt. Secondly, he is the executive officer of the board and as such is given the responsibility for carrying out the policies which the board enacts.

To the teachers and employees of the school district, the superintendent of schools is a professional leader. He helps to determine the educational program, recommends competent personnel, and aids in the in-service preparation of the staff.

To the people of the school district, the superintendent is the interpreter of education. He helps citizens to understand educational problems and issues, and he provides information about all phases of the work of the schools.

The superintendent is also responsible for the business management of the schools. He not only prepares and recommends the annual school budget, but also administers it. He guides the school board and the community on school building issues, and administers the maintenance and operation of the plant. He recommends the purchase of materials and supplies, and when decisions have been made, purchases the materials and is responsible for their use.

Office of Superintendent in Other Countries.—While the office of superintendent of schools in America is unique largely because of the ideology of a particular kind of free society, similar offices are found in the educational systems of other lands. In authoritarian countries such as the Soviet Union, this officer dictates what is done. He represents the state and the state is supreme. In the democratic countries the picture is more complex. Since the free countries are striving to use education as a means of developing individuals in a free society, in the majority of them education has a place at the highest governmental level. A minister of education has equal status with the minister for foreign affairs, war, or finance. This official, then, is administratively responsible for schools and ordinarily he has broad administrative powers. As a result, in those countries there is a centralization of power at the top. Orders are issued to the local level, and consequently superintendents or their counterparts are concerned chiefly with carrying out orders and operating schools.

Great Britain, however, since passage of the Education Act of 1944, has moved to place greater authority for schools at the local level. In Canada the school official in the provincial government exercises the greatest power. Since 1945, many countries throughout the world have sought American missions on education and consultants on their educational problems. There are indications that, as a result of such work, there is a growing trend toward more local control of schools and some emphasis on a greater degree of democratic administration.

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SCHOOLCRAFT, skōōl'kråft, **Henry Rowe,** American ethnologist and author: b. Watervliet, Albany County, N. Y., March 28, 1793; d. Washington, D.C., Dec. 10, 1864. He was educated at Middlebury and Union colleges, in 1820 was made geologist to an exploring expedition under Gen. Lewis Cass to the Lake Superior copper region and the upper Mississippi, and in 1822 became Indian agent for the northwestern frontier, with headquarters at first at Sault Sainte Marie and later at Michilimackinac (or Mackinac). From 1828 to 1832 he was a member of the Michigan territorial legislature. He commanded in 1832 the expedition which discovered the sources of the Mississippi, and in 1836 concluded with the Indians about the lakes a treaty by which cession of 16,000,000 acres of land was made to the United States. Soon afterward he received the appointment of acting superintendent of Indian affairs and disbursing agent for the northern department. In 1847 he began the preparation, under government ap-

pointment, of his elaborate work, *History and Statistical Information Respecting the History, Condition and Prospects of the Indian Tribes of the United States* (1851–1857). For the first five volumes an appropriation of nearly $30,000 per volume was made by Congress; the sixth and last was published at the expense of the War Department. The work was finely printed, and illustrated by 336 plates. It was the first means of introducing Indian legend and tradition to the general reader and gained a considerable reputation as a work of scholarship. Among Schoolcraft's other volumes are *Algic Researches* (1839); *Oneota; or Characteristics of the Red Race of America* (1844); *Personal Memoirs of a Residence of 30 Years with the Indian Tribes* (1851); and *Scenes and Adventures in the Semi-Alpine Regions of the Ozark Mountains* (1853).

SCHOOLEYS MOUNTAIN, skōō'lēz, village, New Jersey, in Morris County, on Schooleys (or Schooley) Mountain 17 miles west of Morristown. The mountain, for which the village is named, is about 1,000 feet high and is a flat topped ridge of the Appalachians. Pop. (1950) 250.

SCHOOLS, Continuation. See CONTINUATION SCHOOLS.

SCHOOLS, Elementary. See EDUCATION, ELEMENTARY.

SCHOOLS, Nursery. See NURSERY SCHOOLS.

SCHOOLS, Secondary. See EDUCATION, SECONDARY.

SCHOOLS, Supervision of. The supervisor in educational systems today is an expert consultant who, by applying democratic methods and procedures, attempts to secure improvement in the teaching and learning environment, and to facilitate the attainment of educational objectives. Even supervision as applied to personnel is reflecting the greater knowledge of basic principles of human relations, and the ability to apply them.

In many of the countries of the world, however, the process of inspection still prevails. Officials critically investigate schools to determine whether ministerial rules and regulations are being observed and educational laws enforced. In other countries, while the terms "inspection" and "inspector" are used, the trend, as may be observed in Canada and England, is in the direction of voluntary consultation on an observation, advisement, and assistance basis. The concept of inspection in the United States is limited to such matters as regulations governing receipt of state aid, school building construction, fire and health hazards, school lunch programs, length of school year, certification of educational personnel, and so on. The term "inspection" no longer is used with reference to the instructional program.

Inspection Under Totalitarianism.—The function of government in educational control under Germany's Nazi regime (1933–1945) was perfectly clear: it was the subordination of the individual to the state. The state merely became a convenient vehicle for the indoctrination of the individual in the ideology of the party. Under the Nazi regime inspection was rigid and included every phase of life. It extended from the Reich ministry to every school and educational medium in the country. Even the faculties of universities were subjected to inspection.

Thus, the content of textbooks was basically a presentation of party ideology. Youth organizations uniformly were subjected to party indoctrination. In fact, the system of inspection was so complete and rigid that education officers in the *Länder*, or states, and the subdivisions thereof merely carried out orders from above. This is the totalitarian formula wherever such a system exists.

The English System.—Prior to the adoption of the Education Act in 1944, the responsibility for education in England was in the hands of the board of education and the president of the board was the political head of the educational service. In 1944 the Rt. Hon. Richard A. Butler, the first minister of education, successfully piloted through Parliament the Education Act, which was to expand and improve the educational service. The minister has the authority to appoint a parliamentary secretary and their responsibilities, in addition to the administration of the Ministry of Education, comprise answering whatever questions may be addressed to them by members of Parliament, either on the floor of the House of Commons or otherwise. They also present legislation or regulations for action.

There is a staff of about 3,000, comprising three different types of personnel: (1) The administrative personnel is largely recruited from the civil service and represents men and women of high distinction who have chosen civil service as a career. (2) Her Majesty's inspectors are men and women who have been in the educational system or with the educational service. They represent personnel of high academic distinction who have entered the educational field in the service of local education authorities, universities, or independent schools. They are selected on the basis of merit for appointment to the inspectorial staff of the ministry. (3) Finally, there is the group known as nonprofessional personnel.

The most important principle on which the English system is based is the distribution of power. Inspection of schools is provided by the local as well as the central authority. William P. Alexander points out in his book *Education in England* (1953) that ". . . The best safeguard for democracy is to insure that a madman coming to power cannot ruin the people. It will be readily conceded that when Hitler came to power in Germany, the fact that he could determine what was taught in the schools of Germany was perhaps the most important factor in creating and consolidating the Nazi Regime."

Thus, while inspection is provided by the ministry, the distribution-of-power principle is the safeguard against autocratic control of the educational system by the central authority. Therefore, at the ministry level, the senior chief inspector heads the service. There are chief inspectors for different types of schools. Divisional inspectors are concerned with particular regions of the country. Staff inspectors and Her Majesty's inspectors of schools are concerned with a limited area, in many cases one local education authority. It is the responsibility of the inspectorate to satisfy the minister that schools are properly conducted in accordance with the statutory and regulative requirements. Her Majesty's inspectors are consultants and advisers available to teachers and local education authorities. They are ready

and willing to give advice, if such is sought. There is no requirement that such be accepted.

Provincial System in Canada.—Since the time of Confederation in Canada (1867), education has been a responsibility of the constituent provinces. As in the United States, where education is recognized as a state function, in Canada it is a provincial function. Within the 10 provinces are approximately 700 inspectors or superintendents of schools, their principal responsibility being supervision. About 10 per cent of the inspectors or superintendents are appointed by local boards of education in cities or large school systems. Ordinarily, however, provincial approval must be obtained for the appointment of these officers. Ninety per cent of the inspectors and superintendents are appointed by the provincial department of education and are employees of the department. Likewise the province and the officials therein determine what constitutes an acceptable minimum educational program. However, certain functions, as for example providing and operating the school plant and program, are delegated to the local education authority.

A generation ago much of the work of the inspector, as was the case in the United States, consisted of a visitation to each school in his area. He would satisfy himself that the school was in session, examine the school register, inspect buildings and grounds, and perhaps confer with the chairman or secretary of the school board. One of the basic responsibilities, however, was to see that the prescribed courses of study were followed and that school laws and regulations were observed. Inspection in this limited sense remains a part of the inspector's duties. However, improving the quality of education and ascertaining whether or not objectives are being met are the primary responsibility of supervision.

Supervision also is carried on through specialized personnel and through the office of the school principal. A knowledge of, and ability to apply, basic principles of human relationships and democratic leadership characterize the supervisory trend in Canada. Supervisors work with educational personnel. There is a mutual educational atmosphere in which teacher learns from supervisor and supervisor from teacher, and group procedures are becoming more and more evident in school supervision.

There are certain trends in supervision in the provinces. Among these are the following: (1) shifting emphasis from the teacher to the teaching-learning process and to the pupil; (2) leadership in developing better communication between schools and the public; and (3) the development of special provincial legislation, allocating authority and responsibility to local authorities to determine educational policy in the larger and wealthier cities. The increasing complexity of administrative problems has complicated the role of supervision. More and more the school principal is becoming an important part of the supervisory program, as well as the program of in-service teacher education. In Canada, then, the trend is toward cooperative effort and away from autocratic direction.

SUPERVISION IN THE UNITED STATES

The heart of an educational system is the educational program. Educational supervision in the United States increasingly has become a matter of contributing to the advancement of education through improvement of instruction and the teaching art by means of consultation and cooperation.

As previously indicated, in many states and local communities the term "supervisor" has been abandoned in favor of the title "consultant" or "curriculum coordinator." The matter of supervision as used in this connection, therefore, is a most important responsibility in every school system. Evaluation to ascertain whether or not educational objectives are being met is important. Understanding human development and the fundamental principles of human relations are basic in school supervisory programs. Helping the individual to become a more effective teacher and providing expertness in curriculum development are responsibilities of what we now call supervision.

While the state may provide general and specialized consulting service, the major responsibility for supervision is delegated to the local school system. The special supervisor in such fields as reading, art, and music will be found in the larger cities and in many larger administrative units. The general supervisor, as, for example, the supervisor of elementary or secondary education, may be part of the supervisory staff; or this responsibility, in many cases, becomes the role of the superintendent or school principal.

Federal Supervision.—A portion of the supervisory program, in small measure, is inspectional in nature. At the federal level, for example, there is little inspectional responsibility with respect to education. In vocational agriculture and other vocational areas for which federal funds are allocated to the state, state plans for these respective spheres must be approved by the United States Office of Education. Accounts are audited to see whether or not the funds are being spent for the purposes for which they were allocated. There may be occasional visits by regional and national representation to see whether or not the plan as presented is actually being carried out. In the case of the school lunch program, again the function of audit and inspection to ascertain whether or not the funds are being spent for the purposes indicated in the act, would be a responsibility of federal representatives, though each state involved in this program also would have a similar responsibility. This same inspectorial responsibility would be found at the national level in programs of rehabilitation, veterans educational programs, contractual relations between universities in this country and universities where these relationships involve federal funds either under technical assistance plans, or the Department of State, or such agency as would be concerned with foreign aid.

State Functions.—The inspectional responsibilities of the state are carried out largely through the state department of education. There are certain regulative responsibilities set forth in the statutes generally involving the establishment of standards with which the local community must comply. Among these inspectional functions are the following:

(1) The certification of teachers. Though the certification requirements for educational personnel generally represent minimum standards for admission to the profession, the local community is permitted and encouraged to go beyond these standards in the employment of the educational personnel. Much of the control element involved in certification could be removed if the various educational organizations for teachers and teacher

training institutions could agree nationally on a body of standards for admission to the profession. Standards vary from state to state. However, because of the critical shortage of teachers at this particular time (1956), there is a tendency to issue a temporary certificate until standards are met. There is also a trend toward reciprocity among the states, especially in New England and in the Middle Atlantic region.

(2) Building codes. In most of the states, a building code has been developed by the department of education, usually with the collaboration of organizations in that state. When a board of education desires to construct a new school building, it is necessary to meet the standards contained in the state code which usually include standards regarding the school site. These codes have gone beyond the safety factor alone and include other matters, such as the size of the classroom, width of corridors, and standards for special facilities, for example, shops, laboratories, and other facilities.

(3) Approval of degree-granting institutions. In many states the state board of education is charged with the responsibility of inspecting and evaluating institutions which seek the degree-granting privilege. The procedure varies from a department expert who reviews the petition, to state departments that bring in outside evaluators to study specific programs in the institution.

Such matters as (4) transportation, (5) the age at which a permit to work may be issued to a child, (6) the specification of the compulsory attendance period, and (7) the number of days schools must be in session—all require inspection on the part of the state though inspection in several instances may be delegated to the local community.

With respect to the educational program, there is an element of inspection still remaining in those areas which are mandated by state legislation; in other words, the state has the obligation to see that certain courses (such as conservation, the effects of alcohol and narcotics, citizenship training, and United States history) are included in the educational program by the local board of education. The government is also responsible for protecting such areas of life as health, natural resources, individual rights, and national security.

If legislation is enacted, the provision of the law should be stated in general terms, leaving to the individual school district the authority for developing the course of study and for deciding on the kind of training which will produce individual competence to live in this complex modern society. The trend toward the inclusion of specific mandates in the law with respect to what shall be taught in the educational system presents certain dangers. It could lead to control of the content of education by the state; also, statutory requirements might become so complex that little but these specifics might be offered by the board of education.

Local Supervision.—Supervision at the local level is the responsibility of the local board of education which provides personnel to carry out state-mandated responsibility. In earlier times the responsibility for ascertaining why students were not in the classroom, or who were absent for unusual periods, was vested in the truant officer. Later on school boards appointed attendance officers. The trend during recent years has been to place the responsibility in the hands of the school social worker. Inspection of school buildings for fire and accident hazards usually is a responsibility of the chief state fire marshal, but ordinarily such duty is carried out locally by the fire authority in the local community.

In many cases, inspectors from the state motor vehicle department provide for the inspection of school buses in areas having large transportation programs. The maintenance of standards of sanitation in cafeterias may be the responsibility of the local health authority; in instances where the board of education has its own health department, inspection may stem from there.

University Programs.—Many state universities employ a high school visitor. His function is to ascertain which schools shall be placed on the accredited list for purposes of admission to the university. Private universities and colleges also have such relationships with the secondary schools. Likewise, inspectional programs are maintained by sectarian organizations for those schools and institutions of higher education that come under their jurisdiction.

Nongovernmental Inspection Agencies.—Quite apart from governmental inspection programs, there are many organizations and agencies which inspect institutions that wish to be recorded among approved institutions and certified as having met the standards of the particular accrediting agency. One of the more difficult problems in the United States has been the multiplicity of accrediting agencies. Different agencies inspect and accredit schools of medicine, engineering, pharmacy, law, social work, and the like. In addition to the American Psychological Association, which approves courses in clinical psychology, there are other such agencies. More recently a movement has developed to consolidate some of these efforts and to secure greater coordination in the present segmented manner of accreditation of institutions.

In some states, as previously indicated, the state board of education or state department of education is legally authorized to inspect institutions for purposes of accreditation, and in many states a charter for the establishment of an institution cannot be granted without the approval of the state board of education and its recommendation to the legislature. Institutions may be inspected by the American Association of University Women to determine whether or not the standards and program of the institution qualify the graduates for membership in this organization.

While these national and regional accrediting agencies ordinarily have no legal authority to accredit an institution, a school which is not on the accredited list is at a disadvantage in that it does not enjoy the prestige of approval; should a graduate desire to continue his studies at a professional school, he is not likely to be accepted in institutions on the approved list.

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SCHOOLS OF DRAMA, Modern. Drama is in a constant state of flux. Nothing begins and ends precisely. No other literary form is so sensitive to changing public tastes as the theater, and for that reason there are always new groups of playwrights forming, and older groups dissolving and blending into the new. A school is the name given to a group of playwrights who, through principles and procedures, fit loosely into

a pattern that can be distinguished from other patterns. Critics and historians have labeled these groupings for the sake of clarity and understanding.

Because Henrik Ibsen represented a distinct break with the past, and has influenced in some way almost every 20th century playwright, the works of Ibsen are considered as the beginning of modern drama. Ibsen was the leader of the school of realism. He explored realistically and honestly many of the controversial aspects of life in the last two decades of the 19th century. He wrote, to his way of thinking, without compromise with his audience or with the critics of the day. Among his important plays are *Peer Gynt, A Doll's House, Ghosts, An Enemy of the People, A Wild Duck, Hedda Gabler,* and *John Gabriel Borkman.*

Since no school rises independently of what has gone before, it is important to review some of the great theater movements which preceded Ibsen. The first great school of drama was the Greek which flourished during the 4th and 5th century B.C. The plays were highly stylized, followed semireligious forms, and limited themselves to traditional themes and situations. Among its remembered playwrights are Aeschylus, Sophocles, and Euripides in tragedy, and Aristophanes in comedy. The Roman school emerged in the middle of the 3d century B.C. and lasted until the middle of the 1st century A.D. Plautus and Terence (2d century B.C.) were the outstanding writers of comedy; Seneca (1st century A.D.) was the most important writer of tragedies.

Medieval schools of writing developed the mystery, the miracle, and the morality plays which grew out of the liturgy of the church itself. Beginning with the 9th century, these schools gradually blended with the literary and professional elements of the theater until, by the middle of the 16th century, the medieval qualities were absorbed by the Elizabethan dramatists.

The Commedia dell' arte (improvised comedy) was a significant force in the theater from the early 16th century to the middle of the 18th. Originating in Italy, it spread throughout Europe and England. The comedies possessed only a skeleton outline to be filled in by the originality and inventiveness of the actors. Neo-Classicism (Classic French school) has as its leading exponents Pierre Corneille, Jean Racine and Molière (Jean-Baptiste Poquelin). Playwrights of this school reached their heights during the last two thirds of the 17th century. They carried the Greek unities of time, place, and action to the extreme, and wrote for an intellectual and limited audience.

The Elizabethan school, which marked the late 16th and early 17th century in England, was perhaps the greatest creative period in the history of literature. The play itself was the great intellectual stimulus, and the works of Shakespeare overwhelmed all other works. While Elizabethan plays followed classical models, they exhibited flexibility of form and showed concern for human problems and conflicts.

The school of Restoration playwrights (1660–1710) was marked by wit, superficiality, and sophistication, John Dryden, Sir George Etherege, William Wycherley, Sir John Vanbrugh, William Congreve and George Farquhar were representative playwrights.

There were several schools of romantic playwrights. Spain experienced a dramatic revival contemporary with the Elizabethan drama, in which plays were molded to a romantic pattern in plot, dialogue, and action. Pedro Calderon de la Barca, Lope de Vega Carpio, and Miguel de Cervantes Saavedra were the notable playwrights. The first three quarters of the 19th century saw another romantic school arise in France. Victor Hugo was the most successful figure in that group.

In the last half of the 18th century, a Classic school arose in Germany, attracting such major literary figures as Gotthold Ephraim Lessing, Friedrich von Schiller, and Johann Wolfgang von Goethe. Eugène Scribe and Victorien Sardou were exponents of the well-made play in which ingenuity of craftsmanship was more important than characterization and meaning. This late 19th century movement had among its exponents in England Arthur Wing Pinero.

In the last quarter of the 19th century, throughout Europe and America, came an exciting, almost spontaneous awakening. The playwright seemed suddenly to realize his potentialities. In the face of public and critical disapproval, he refused to be bound by traditional dramatic conventions and dared to explore society and human nature. His new-found power gradually inspired a similar awakening throughout the theater world.

The naturalistic school of playwrights developed almost concurrently with the realistic. The naturalistic playwright defied the conventionality of the formalized theater and sought to express life as it was without comment and without compromise. Abnormality, crime, disease, economic exploitation of the working classes, and insanity, were among the subjects which preoccupied the playwrights. While there were naturalistic elements in August Strindberg (Sweden), Anton Chekhov, Maxim Gorky, Count Leo Tolstoi (Russia), Eugène Brieux (France), Hermann Sudermann and Gerhart Hauptmann (Germany) were the acknowledged leaders of this movement. It must be remembered that no modern school of playwriting dies out completely nor does it ever dominate. There is a cumulative effect with the immediate past always being felt, yet there is the constant pressure of the new and the changing. A modern school of playwriting will owe something to every trend since the realism of Ibsen. The pure naturalist may no longer exist, but the early exponents of naturalism opened the way for many more modern playwrights.

Symbolism was a reaction against realism and naturalism. The symbolists (playwrights, painters, and poets) elevated the concept of inner truth expressed by suggestion to much greater significance than the outward, physical action. Maurice Maeterlinck was the great leader of this movement.

Impressionism was a revolt against the realism of appearance. Through simplicity and selection of detail, larger implication was achieved. Impressionism was carried farther by the expressionists. The expressionists, through selection and impression, wrote what they felt to be basic truths of life. This expression, they felt, was desirable even though the audience did not follow it, and even if the results were brutal, shocking, abrupt, and extravagant. Frank Wedekind, Ernst Toller, Franz Werfel and Georg Kaiser were the chief exponents of expressionism in Europe. Elmer Rice's *The Adding Machine,* George Kaufman and Marc Connelly's *Beggar on Horseback,*

Eugene O'Neill's *Emperor Jones* are impressionistic-expressionistic. In differentiating impressionism and expressionism it is probably well to note that impressionism is concerned with the feeling of truth produced by the production of the play. It deals with sets, costumes, and properties that give the right tone or feeling—and in doing so affects the structure and the dialogue for the play. Expressionism is concerned with an inner feeling of truth within the play that may be produced by symbols, fantasies, and dialogue that have little resemblance to the actual world.

In Paris, boulevardism was a school whose best known exponents were Charles Maurice Donnay, Felix Henri Bataille, Paul Hervieu. It was preoccupied with the sex relationship of men and women without much regard for reality, but with considerable attention to the whims of the audiences that patronized the boulevard theaters. The Gallic attitude toward love often shocked or at least confused English and American audiences. Boulevardism flourished from the turn of the century to World War I, although elements of boulevardism continue in the French theater.

English drawing room comedy has had followers consistently from the middle of the 18th century to the present time. The intention is to be gay and witty; the production is easily staged; the opportunity for the actor is great; gowns and dinner jackets, tea and cocktails, estates and servants are essential. The plays are often popular for years in the college and community theater. Their charm, when sympathetically acted, is pervasive. While these plays are usually written with both eyes on the box office, they often have a literary value in the quality of the writing that lifts them above the average of general theater standards. Richard Brinsley Sheridan, Oscar Wilde, W. Somerset Maugham, Noel Coward, Alan A. Milne, Ivor Novello in England, and Philip Barry, John Van Druten and Samuel N. Behrman in America are among the best of the writers of drawing room comedy.

The playwrights interested in social dramas have been numerous, insistent, and talented. They are aggressively concerned with the exploitation of the weak, impoverished, or economically unfortunate; they often put the responsibility for social injustice on a capitalistic society; they deal with strikes, scenes of struggles and violence; they are concerned with the unjust treament of racial minorities. This school, a direct descendant of Ibsen, is sometimes called the School of Social Protest or Proletarian drama. George Bernard Shaw, John Galsworthy, Sean O'Casey, Clifford Odets, John Howard Lawson, Sidney Kingsley, Irwin Shaw, Marc Blitzstein, and Lillian Hellman are among those writing plays that have explored social issues.

Folk, regional, and rural drama are all somewhat in the same grouping since they rely strongly on the influence of environment on the lives and actions of the characters. Rural drama in the 19th and early 20th century portrayed, usually with comic emphasis, the problems of country types often in conflict with the unprincipled exploiter from the city, with the rural characters possessing an unusual shrewdness that made them the ultimate victors. The rural drama gave us such types as the Yankee in the 19th century and the vaudeville rubes in the 20th. As rural drama gained realism and authenticity, it was called folk drama. It dealt with simple, illiterate, remote people with increasing insight, poetry, and understanding. Folk drama had its roots in the 19th century but playwrights like Percy Mackaye, Paul Green, Lynn Riggs, and Marc Connelly gave it beauty, interpretation, and a secure position in the American theater. Regionalism is the larger term that encompasses folk and rural drama because regionalism is the school of drama in which the region, area, and environment, is the dominant force in the creation, interpretation, and production of the play. Regionalism had its expression in England with the Birmingham Repertory Company, in Ireland with the Abbey Theatre and the Irish Players, in the United States with the Carolina Playmakers. Regionalism is now a part of the contemporary theater tradition, though until the 1930's, it was thought of as the particular preoccupation of the "little" and experimental theaters.

Surrealism is that school of writing which presents the subconscious with no necessity for form or meaning other than the dreamlike association of ideas. The playwright may or may not have a meaning grasped by the audience, but if he creates an emotion, that is enough. Surrealism is more likely to be an element in the theater rather than the entire play. It lends itself most easily to the one-act form.

The psychological play appears in various forms. Elmer Rice's *Dream Girl* and Moss Hart's *Lady in the Dark* explore the problems of psychoanalysis. The psychological horror play, exemplified by *Laura, Rebecca, Night Must Fall, Blind Alley, The Two Mrs. Carrolls,* shocks the audience. Its purpose is to present in a plausible, well-motivated manner a terrifying situation. It usually involves murder based on a psychological aberration.

Two schools of farce have appeared in America with such definite characteristics that one is noted as the play with the George Abbott touch; the other the play with the George Kaufman touch. The Abbott farce is fast paced, wisecracking, with rapid-fire gags and dialogue. It is superficial in characterization but never lacking in humor. The humor is observant and ingenious rather than satiric and penetrating. Each play seems indelibly stamped with the personality of George Abbott. Some of the plays which carry the imprint of his technique are *Room Service, Brother Rat, Three Men on a Horse, What a Life,* and *Kiss and Tell.*

George Kaufman has had many collaborators yet all of his plays have a style that is defined as the Kaufman touch. His farces are sharp, cruel, penetrating, freely associative. They are satiric and show psychological insight into human affairs. *Dulcy, Once in a Lifetime, Of Thee I Sing, June Moon, Beggar on Horseback, The Man Who Came to Dinner* are popular examples of this school.

The Federal Theater set up by the United States government during the depression of the 1930's as a relief measure for professional theater people, prompted some of the very important experimental activities of the 20th century. Several of the Federal Theater units, particularly those in New York, Chicago, San Francisco and Los Angeles, had hundreds of trained performers on their rolls. This abundance of personnel made it possible for the Federal Theater to stage spectacles involving myriads of performers. The writers would take a problem like housing in New York and explain, by the use of motion pictures, slides, music, dance, speeches, episodes

of a realistic, or expressionistic, or surrealistic nature, the significant implications of the modern housing problems. The projection of a problem was the first necessity. Any device known to the theater could be used to interpret a social or an economic problem in a realistic, informative way. This provocative and significant movement established the dramatic form known as the living newspaper.

Existentialism, a post-World War II movement, is rooted in 19th century philosophy. Related to expressionism, symbolism, and surrealism, its basis is a belief that the important quality in man is his uniqueness. Social pressures threaten the real, the lonely man. His importance, however, is existence itself. Anything but man's real existence is false. Modern man has allowed himself to act as if he were the sum total of social and environmental pressures with his identity forced upon him from without rather than from within. Existentialism asks that a man act from within, from an inner core of being rather than from superimposed ideas. Since each man is unique and each man is changing, he can only act in terms of that inner uniqueness, that inner loneliness. He is, then, not to be concerned with relationships of father, mother, child, society. He is concerned only with being. Jean Paul Sartre is one of the most important exponents of existentialism.

Many important playwrights cannot readily be classified in schools.

Maxwell Anderson, for example, has written many successful plays in verse form; *Winterset, Elizabeth the Queen, High Tor, Knickerbocker Holiday.* Yet, except for T. S. Eliot's *Murder in the Cathedral,* there have been few poetic plays produced. Many exist in book form and in manuscript.

George Bernard Shaw has written plays or scenes in plays that can be fitted into the drama of social protest, impressionism, expressionism, or drawing room comedy. But Shaw has his own characteristic way of looking at the world, so that one speaks of Shavian drama as a school, though Shaw is its only member. Shavian drama is witty, quixotic, penetrating, wise, and concerned with ethical values on a broad scale that transcends national boundaries.

In America, Eugene O'Neill is another writer who defies classification. He is a regionalist in *Beyond the Horizon* and *Desire Under the Elms;* an impressionist in *Emperor Jones;* an expressionist in *Lazarus Laughed, Dynamo, The Hairy Ape;* a symbolist in *The Great God Brown;* a realist in *Anna Christie;* and an experimentalist in his own right in such things as *Mourning Becomes Electra* and *Strange Interlude.*

Schools of drama have always been influenced by the past. With the 20th century came a multiplication of the forms of dramatic expression that influenced theater. To flesh and blood actors in a theater was added the drama of radio, television, motion pictures. These forms give variety and fluidity to dramatic expression and, while they borrow and take their existence from legitimate theater, they also contribute to theater. Dramatic expression in the 20th century has a wider audience and greater global implications than it has had in any previous period in the history of the world. Within this complex and provocative world, the playwright has leaders and schools to follow, but he also has the latitude of further individual growth and experimentation.

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SCHOONAERDE, skōn'är-dĕ, Belgium, in East Flanders on the Scheldt River, in the arrondisement of Termonde. The town is a center for milling and chemical industries, also handmade lace. There are coal mines in the neighborhood. Pop. about 2,215.

SCHOONER. See SAILING VESSELS; SHIP.

SCHOONER RIG, the rigging of a fore-and-aft-rigged vessel. This type of rigging enables a vessel to sail closer to the wind than can a square-rigged ship. Schooner-rigged vessels are also more easily maneuverable and can be handled with smaller crews. The typical schooner of the 18th and early 19th century which engaged in the American coasting trade and, to a lesser extent, in transoceanic trade, was a two-masted vessel, with foresail, mainsail, topsails, staysail and one or more jibs. When a schooner is rigged with a square fore-topsail and topgallant sail, it is called a topsail schooner. About 1840, larger vessels of three or more masts came into use. Since then, down to the early years of the 20th century, American shipbuilders rivaled in the construction of ever larger schooners with more masts and consequently greater area of canvas. Schooners built in the 1880's and 1890's were often of large size, of 2,000 or 3,000-ton burden, and four, five, or even six masts. These schooners were generally constructed for the foreign trade. The only 7-master was the *Thomas Lawson,* 368 feet in length and of 5,200 tons, built at Fore River, Mass., in 1902. Her sails were raised by a donkey engine, making it possible to sail her with a relatively small crew. Few large schooners were built after the first decade of the century. The schooner has always been a favorite and distinctive American rig; but in the 19th century French and English shipyards built schooners. The fishing fleets sailing out of Massachusetts ports were schooners until, in the 20th century, steam replaced sail. The first American yacht to gain fame as a racer was the 65-foot schooner *Wave,* built by John C. Stevens at Hoboken, N. J. in 1832. The *America,* which won the Royal Yacht Squadron race at Cowes in 1851, initiating international yacht races, was also a schooner.

SCHOORLE, SKŌ'RĔL, **SCOREL,** or **SCHOREL, Jan van,** Dutch painter: b. Schoorl, near Alkmaar, Aug. 1, 1495; d. Utrecht, Dec. 6, 1562. At 14 he was placed with the painter Willem Cornelis. Three years later he traveled to Amsterdam, and spent some years in the studio of Jakob Cornelis, one of the most celebrated painters and engravers on wood of that period. He next became a pupil of John of Mabuse, in Utrecht, and subsequently visited

many cities, including Cologne and Spires, where he studied architecture and perspective. He was received kindly by Dürer in Nuremberg. At 22 he passed through Carinthia to Venice, and thence to Palestine. For three years he remained within the walls of Jerusalem sketching views of the city and surrounding country. On his return he spent some time at Rhodes, and afterward at Rome, studying the works of Raphael, Michelangelo and Giulio, till Adrian VI, a native of Utrecht, ascended the papal chair in 1522, and committed to him the superintendence of the Belvedere. The death of Adrian the following year induced Schoorl to return home, which he did by way of France. He now executed many splendid pieces in Utrecht, afterward in Haarlem and from time to time in other cities in the Netherlands. He has been compared with Jan van Eyck, whom he equaled in splendor and truth of coloring, in expression, in warmth of representation; and, at the most, was inferior to him only in the execution of particular parts. Unhappily the rage of the fanatics in a subsequent age for destroying pictures was fatal to many of his most valuable works. Consult Toman, 'Studien über Jan van Scorel' (1889).

SCHOPENHAUER, shō'pĕn-how-ĕr, **Arthur,** German philosopher and man of letters: b. Dantzig, 22 Feb. 1788; d. Frankfort-on-the Main, 21 Sept. 1860. He was of Dutch ancestry on both sides. His father, Heinrich Schopenhauer, was a rich merchant, whose love of freedom was so great that he removed to Hamburg in 1793, when his native city, Dantzig, lost its independence and became a part of Prussia. Schopenhauer's mother, whose maiden name was Johanna Troisner, was a woman of artistic temperament and literary aspirations, some 20 years younger than her husband. After his death in 1805, she removed to Weimar, becoming a member of the literary coterie there, and gaining a reputation as a popular novelist. Heinrich Schopenhauer, proud of his position as an independent merchant, determined that his son should succeed him as the head of the business which he had established. With this object in view, he had him instructed in modern languages, especially in French and English, and took the boy with him on extensive trips through England, France, Holland and Germany, in order to give him a knowledge of the world. When Schopenhauer was 17 his father placed him in a business house in Hamburg. The work was distasteful to him and after his father's death, when he had vainly attempted to accommodate himself to a business career, he decided to follow his bent and devote himself to study. After receiving the necessary preliminary training at Gotha and Weimar, he entered the university at Göttingen in 1809, registering as a student in medicine. Later he studied in Berlin, where he heard lectures from Fichte and Schleiermacher, and finally received the degree of doctor of philosophy from the University of Jena in 1813, on subm tting a thesis on "The Fourfold Root of the Principle of Sufficient Reason." After a residence of several years in Dresden, where he wrote his chief work, 'The World as Will and Idea' (Die Welt als Wille und Vorstellung, 1818), and a visit to Italy, he qualified as private lecturer (*Privat Docent*) in the University of Berlin. He came there with the most extravagant estimate of the importance of his own views, and with the greatest contempt for the prevailing idealistic philosophy, of which Hegel, then at the height of his popularity at Berlin, was the chief representative. Schopenhauer announced lectures at the same hour when Hegel's principal course was given. As a result, his audience was very small; and to make matters worse, his style of lecturing was not popular; his audience fell off and the lectures had to be discontinued before the end of the semester. This embittered him still more, and he imagined that he was the victim of a deliberate plot on the part of various "school philosophers" who had conspired to prevent his views from obtaining a hearing. He made a second visit to Italy, lasting almost three years, but returned to Berlin in 1825, residing here, until 1831, when the epidemic of cholera that carried off Hegel drove him to Frankfort. Here (with the exception of a short stay at Mannheim) he continued until his death. Toward the close of his life his philosophy began to attract popular attention, and Schopenhauer eagerly received the admiration and recognition of a circle of devoted disciples. His old age was the most happy and serene period of his life, though his estimate of his own work was so high that it was not possible to satisfy his demands for recognition and adulation.

Schopenhauer maintains that philosophy cannot be a science; that is, a body of truths derived through logical processes and open to anyone to learn with more or less trouble; but true philosophy is art, a revelation dependent on the intuitive insight of the man of genius. As in the case of a picture or musical composition, one will only perceive in a system of philosophy what one has the capacity to perceive. "There is no one philosophy," says Schopenhauer, "existing or acceptable for everybody. The difference in grades of intelligence is too great for that. The true philosophy, when it makes its appearance, will only command the attention of a few heads of the first order." To the circle of men of genius, then, Schopenhauer confidently claims to belong, and he expresses his contempt for the procedure of the savants who vainly seek philosophical truth by logical processes and accumulations of erudition. For Plato and Kant, Schopenhauer has the greatest admiration and his own thoughts are constantly connected with their ideas. In Plato what attracted him especially was the doctrine of an ideal world and its contrast with the unreality of the world of sensible phenomena. Kant maintained the same contrast and Schopenhauer always claims to be the true successor of Kant, although he replaces the latter's table of 12 categories with the single principle of "sufficient reason," which appears in a fourfold form. With regard to Kant's doctrine that we cannot know the true nature of reality, Schopenhauer also differs from his master. Science is, indeed, limited to the world of phenomena. But we can know the nature of reality by a more direct and intimate method than that which science pursues. In the immediate consciousness of myself I know myself as will; this is the side, the true reality of what appears objectively as body. After the analogy with ourselves everything is to be interpreted: in ourselves,

we have the key that enables us to understand the world. The universe is in itself will. Like the individual, it has its phenomenal side, which can be known by the objective sciences. But its ultimate nature is will, blind, unconscious striving toward existence. The essence of each thing is found in its will. This essence manifests itself in various ways, and with varying degrees of consciousness, from the anconscious manifestations of inorganic forces like gravitation, to the conscious volitions of men.

Though the will is the ultimate source of reality, it creates for itself an external or phenomenal order. This is the order of the intellect, known in terms of the idea, and appearing as an external order of events in space and time which are connected by the principle of cause and effect. So far as the world of phenomena is concerned Schopenhauer is there in fundamental agreement with Kant. That is the realm of scientific knowledge of law and of intelligibility. But behind this as its source and centre is the reality of the irrational will.

The doctrine that the essence of all things is will, is the basis of Schopenhauer's Pessimism (q.v.), just as Hegel's view that reason is the ultimate ground of all things is the foundation of his optimism. Will, for Schopenhauer, is essentially and radically irrational. Under the concept of will he includes all desires, strivings and impulses, all tendencies to change. These, Schopenhauer declares, are all manifestations of dissatisfaction and pain. Our life itself is essentially painful. Pleasure is merely negative, being nothing but the relief arising from the temporary cessation of our pain and desires. Since the will, both in us and in nature, is irrational in its inmost nature, there is no hope of things becoming better. Pessimism necessarily results from insight into the ultimate nature of things. Schopenhauer dwells with extraordinary eloquence on the unspeakable misery of life and upon the aimless striving and irrationality that is everywhere manifested in the world process. But yet, in a way, this insight into the worthlessness of existence brings with it a means of escape. Relief is possible only when the will is stilled and the desires and appetites are silent. Such redemption one can attain in the contemplation of works of art or in listening to music. In this artistic enjoyment our wants cease to exist, the attitude of will is canceled. This relief, from its very nature, can only be transitory. Final redemption from the will must come through ethics. We must perceive that all willing is vain and pleasure unattainable, and also that since individual existence is untrue and only phenomenal, all individuals are at bottom identical in essence, that is, all are manifestations of the one world will. This is to some extent effected through sympathy. There is, however, a higher and more complete virtue than sympathy. It is found in the complete negation of the individual will, the denial of the will to live, based on insight into the nothingness of finite existence. Of this negation of the will we have examples in Christian and Oriental asceticism. This denial of the will is holiness and blessedness in one. It is from the point of view of knowledge Nirvana, nothingness, yet in it the soul finds its highest peace and truest reality.

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SCHOULER, skoo'lėr, **James,** American lawyer and historian: b. Arlington, Mass., 3 March 1839; d. 16 April 1920. He was graduated from Harvard in 1859, admitted to the bar in 1862, but was obliged to give up his large practice in 1870 because of deafness, caused by service in the Civil War. He then devoted himself to literature almost exclusively until 1884, when he engaged successfully as a lecturer. He was lecturer and professor at the Boston University Law School and at the National University Law School at Washington and in 1891 was appointed lecturer on constitutional law and history at Johns Hopkins, serving until 1908. His publications include 'The Law of Domestic Relations' (1870); 'The Law of Bailments'; 'The Law of Personal Property'; 'The Law of Husband and Wife'; 'Eighty Years of Union' (1904); 'Executors and Administrators' (1883); 'Wills' (1887); 'History of the United States under the Constitution, 1783–1877' (7 vols., 1880–1913); 'Life of Thomas Jefferson' (1897); 'Alexander Hamilton' (1901); 'Americans of 1776' (1906); 'Ideals of the Republic' (1908).

SCHOUTEN, skou'tĕn, **Willem Cornelis,** Dutch navigator: b. Hoorn, c. 1567; d. Madagascar, 1625. For several years previous to 1610 he was in the employ of the Dutch East India Company. He then determined to discover a new route to the Indies and with Jakob Lemaire of Hoorn began the formation of a company with 200,000 florins capital, Schouten's share being one eighth. He sailed in command of an expedition, June 14, 1615, was the first to round the cape which he called Cape Horn and crossed the Pacific to Batavia. Here he was arrested for infringement of the East India Company's privileges; but on his return was acquitted, while the company was fined. He discovered Schouten Islands off the northern coast of New Guinea.

SCHRADER, shrä'dėr, **Frederick Franklin,** American journalist and dramatist, son of an American citizen: b. Hamburg, Germany, Oct. 27, 1857. Author of plays, *The Man from Texas, The Modern Lady Godiva, At the*

French Ball,' 'Nicolette,' comic opera, music by Irenée Bergé, translated into Bohemian and produced in New York, 25 Dec. 1915; 'Corsica,' music drama in one act, music by Irenée Bergé, produced in 1910; lyrist of 'Baron Trenck,' produced in London 1911 and New York 1912. Translator of Max Nordau's, 'Freie Liebe' ('Paris Sketches'), and 'José,' novel, by Otto Ruppius. Assistant and Acting Secretary, Republican Congressional Committee, 1896–1900; author of Republican Text Book 1898. Dramatic editor Washington *Post* 1901–06; on literary staff, David Belasco 1906–09; dramatic editor New York *Globe,* 1909–10; editor New York *Dramatic Mirror* and president publishing company, 19 Aug. 1912 to 9 Sept. 1916. Co-founder with George S. Viereck of *The Fatherland,* August 1914; editor of *Issues and Events.*

SCHRADER, Julius, German painter: b. Berlin, 16 June 1815; d. Lichterfelde, 16 Feb. 1900. He studied at the Berlin Academy and at Düsseldorf under Schadow, 1837–45. Subsequently he traveled in Italy, England, Holland and Belgium and in the last country fell under the influence of the colorists Gallait and Biefoe. In 1851 he became professor at the Berlin Academy. Among his chief works are 'Surrender of Calais to Edward III' (1847); 'Frederick the Great after the Battle of Kolin' (1849); 'Death of Leonardo da Vinci' (1851); 'Milton and His Daughters' (1855); 'Cromwell at the Death-Bed of His Daughter' (1859). In fresco he painted 'First Twelve Christian Monarchs' in the Royal Chapel, and 'Consecration of the Church of Saint Sophia, Constantinople' in the New Museum, Berlin. Among his portraits are those of Humboldt and Ranke, the historian.

SCHREIBER, shrī'bĕr, **Sir Collingwood,** Canadian railway engineer: b. Essex, England, 1831; d. 1918. He settled in Canada in 1852 and engaged in engineering at Toronto. He was assistant engineer of the Toronto and Hamilton Railway in 1852–56; superintending engineer of the Northern Railway in 1860–62; division engineer for the Nova Scotia government in 1863–67; and in 1867–73 he had charge of the surveys of the Intercolonial Railway and was chief engineer of the government railways in operation. He was appointed chief engineer of the Canadian Pacific in 1880; became chief engineer and Deputy Minister of the Department of Railways and Canals, Ottawa; and in 1905 he was appointed consulting engineer to the Canadian government and chief engineer of the western division of the National Trans-Continental Railway. He was knighted in 1916.

SCHREINER, shrīnĕr, **Olive** (better known by name of Olive Schreiner Cronwright), pseudonym "Ralph Iron," South African author: b. Basutoland 1862; d. 1920. In 1883 appeared "Ralph Iron's" first work, 'The Story of an African Farm,' a book of much interest with simple yet forceful pictures, from the Boer country. Further publications are 'Dreams' (5th ed., 1893); 'Dream Life and Real Life' (1893); 'Trooper Peter Halket of Mashonaland' (1897); and 'An English South African's View of the Situation' (1899); a critique on the Transvaal difficulty from the pro-Boer position. She was married in 1894 to S. C. Cronwright. Her posthumous novel, 'From Man to Man,' was published in 1927.

SCHREINER, Oswald, American agricultural chemist: b. Nassau, Germany, 29 May 1875. He was graduated at the Baltimore Polytechnic Institute in 1892, the Maryland College of Pharmacy in 1894, and later studied at Johns Hopkins University and at the University of Wisconsin. He was United States Pharmacopœia Research Fellow in 1895–96, and in 1903 was appointed chemist of the United States Bureau of Soils. From 1906 he was chief of the Division of Soil Fertility Investigation; and in 1914 he was appointed consulting professor of chemistry at the American University. He has prepared many of the bulletins of his department and is also author of 'The Sesquiterpenes' (1904); 'Chemistry of Soil Organic Matter' (1910); 'The Nitrogenous Soil Constituents' (1913), etc.

SCHREYER, shrī'ĕr, **Adolf,** German artist: b. Frankfort-on-the-Main, 9 May 1828; d. Kronberg, Prussia, 29 July 1899. He studied at the Städel Institut, Frankfort, then at Stuttgart, Munich and Düsseldorf and supplemented this school instruction by wide travels in Europe and the East. In 1862 he became court-painter to the Grand Duke of Mecklenburg-Schwerin. He was a member of the academies of Antwerp and Rotterdam. Before 1870 he lived much at Paris; but after that year lived alternately there and at Kronberg. He was an animal painter, especially choosing the horse for his model and depicting it in vigorous action or, when held in rein, with pawing feet and distended nostril. He was, also, a follower of Fromentian in his love of Eastern subjects, particularly mounted Arabs dressed in brilliantly colored clothes, surrounded by a heated palpitating atmosphere. Some of his pictures are 'Artillery attacked by Prussian Hussars' (1854); 'Wallachian Transportation Train in Rainy Weather,' at Hamburg; 'Charge of Artillery of the Imperial Guard' (1865); 'Horses of the Irregular Cossacks' (1864) at Paris. His 'Battle near Waghensel, in 1849' (1858); 'Battle of Komorn,' 'An Attack of Cavalry,' and 'Prince Thurn and Taxis wounded at Temisvár' are among his best-known pictures, but are lodged in private galleries in Europe. Many canvases by Schreyer are to be found in the private collections of the United States, such as the Walters, the Vanderbilt, the Astor and the Huntington galleries. 'The Watering Place' is at the Corcoran Gallery at Washington.

SCHROEDER, shrē'dĕr, **Seaton,** American rear-admiral: b. Washington, D. C., 17 Aug. 1849. He was graduated at the United States Naval Academy in 1868, and accompanied Commodore Rodgers' expedition against the Korean forts in 1871. He was on special duty supervising the construction of the dynamite cruiser *Vesuvius* in 1888–90, and was in command of that ship in 1890–93. He was executive officer of the *Massachusetts* in 1897–99, and was advanced three points in rank for his services in the Spanish-American War. He was naval governor of the island of Guam and commander of the *Yosemite* in 1900–03; attained rank as rear-admiral in 1908, and was in charge of a division of the Atlantic fleet in 1908–09. From March 1909 until June 1911 he

was commander-in-chief of the Atlantic fleet. He then served on the General Board until 17 Aug. 1911, when he was retired upon reaching the age limit. He was retained on special service with the navy in 1911–14; and in 1917 was appointed hydrographer. Author of many essays and of 'Fall of Maximilian's Empire' (1887). Died Washington, D. C., 19 Oct. 1922.

SCHUBART, shoo'bärt, **Christian Friedrich Daniel,** German poet: b. Obersontheim, Swabia, 26 March 1739; d. Stuttgart, Germany, 10 Oct. 1791. He studied theology at Jena where he lived a dissipated life, and became musical director at Ludwigsburg in 1758, but was banished because of his dissolute conduct. After years of wandering he founded his *Deutsche Chronik* at Augsburg in 1774, but was driven thence in 1777 and removed his *Chronik* to Ulm. He there published a false report of the death of Maria Theresa and was imprisoned for 10 years when he was released at the demand of Frederick the Great in 1787. He then became musical and theatre director in Stuttgart and continued the publication of his paper under the title *Vaterlands-Chronik.* He wrote 'Gedichte aus dem Kerker' (1785); 'Hymnus auf Friedrich den Grossen' (1786), etc. His 'Gesammelte Schrifte und Schicksale' was published in eight volumes (1839–40). Consult Strauss, 'Schubart's Leben in seinen Briefen' (1849).

SCHUBERT, shoo'bĕrt, **Franz Peter,** Austrian composer: b. Vienna, 31 Jan. 1797; d. there, 19 Nov. 1828. His extraordinary musical gifts were displayed at a very early age, and his talents were so pronounced that his teachers had little else to do but kindle the ever-present though dormant spark.

Before he was 11 years old he was the leading soprano in the Lichtenthal choir, and he also played the violin solos in the services, besides composing songs and pieces for strings and piano. In his 12th year he entered the Imperial Convent, or school for educating choristers for the court chapel. His first piano composition, dated 8 April–1 May 1810, appears to have been a four-hand Fantasia, containing a dozen or more movements. While at the "Convent" he composed his first symphony, in D, in connection with the celebration of the birthday of Dr. Lang, the director of the school. His voice breaking, he returned home about the end of October 1812, in which year his mother died. He then joined his father in school work and for three years taught the primary class. Apart from his school duties he naturally devoted himself to composition, especially in the direction of setting words to music, to which he gave himself up with tremendous enthusiasm. His melodies seemed to be endless, his songs sprang into existence and poets could scarcely write down their verses before Schubert had them set to music. In the intervals snatched from his regular duties he found time to write eight operas, four masses and other sacred works, besides a great number of songs. In 1817 he was enabled to throw off the fetters of his school work through the generosity of his friend Schober. From this time till his death there was only one brief decade, but the number of his compositions during that time is stupendous. He composed with the greatest ease and rapidity, and it is said that he could readily keep up a conversation while writing even his best pieces. He never hesitated, and seldom revised anything he wrote. His compositions included more than 70 part songs, some 18 works for the stage, 8 sacred pieces, 20 string quartets, 10 symphonies, and 24 pianoforte sonatas, but after all it was not through these that Schubert's name was immortalized, but through his songs, the titles of nearly 500 of which are recorded. They were full of dramatic intensity, poetry and pathos, and full of music of infinite beauty set to long, complex poems, to which he arranged accompaniments of complete fitness and endless variety.

His engagement as teacher of music in the family of Count Esterhazy during the summer of 1818, at Zselész, was the source of his first regular income. There were two daughters in the Esterhazy family, Marie and Caroline, and a little boy of five. The congenial occupation of teaching them was renewed later, in 1824, at which time he composed his 'Grand Duo' (opus 140), full of individualism and truly a symphonic work in its fullest sense. During that summer he also composed his sonata in B flat, the variations in A flat, and a number of other pieces, presumably for use in the musical education of the Count's children.

To attempt to even mention any considerable number of Schubert's compositions here is manifestly impossible, but very complete lists of his works, arranged both alphabetically and also in the order of their composition, may be found in Grove's 'Dictionary of Music.'

One of Schubert's closest friends was Vogl, the tenor, through whose influence the attention of theatrical managers was attracted toward him. He had already written a comic operetta, the 'Zwillingsbrüder,' for the Kärntnerthor theatre, and not long after he was commissioned by a rival theatre to write the music for the 'Zauberharfe,' or 'Magic Harp,' which he is said to have completed in two weeks, and which was first performed on 19 Aug. 1820 in the Theater an-der-Wien. During this year, too, he wrote several of his best songs, including the famous 'Im Walde' or 'Waldesnacht.'

In the following February, when Schubert was entering his 25th year, his talents began to receive recognition, and the publication of his songs was at last within sight. The 'Erl King' was chosen first and was published (on commission) on 1 April 1821, enough money having been subscribed at one of the Gundelhoff concerts to defray the cost of printing, engraving, and still leave something over for future publications. Seven more songs (constituting op. 3 and 4) were published on 29 May, op. 5 on 9 July, op. 6 on 23 August and op. 7 on 27 November. The next appeared on 9 May 1822, as "the property of the publishers," who now stopped publication by commission realizing that they could assume the responsibility without risk.

In August 1821 he began his symphony in E, which, although he did not complete the writing of it, is remarkable for the rapidity with which it was composed. It is said that he probably did not occupy himself with it for more than a few hours, and yet it filled 167 pages. A month or two later he wrote two acts of 'Alfonso and Estrella,' the words being

supplied by Schober. The third act was finished in February 1822, but no public performance of it was given until 26 years after Schubert's death, one cause of this delay being that the original accompaniments proved impossible for a band to play. During 1823 Schubert paid special attention to operatic music but without marked success, perhaps because the librettos were unsuitable. On this point Liszt regarded it as extraordinary that one who had been brought up to love the finest poetry should accept the absurd and impracticable librettos which were offered him, and which resulted in so much of his brilliant music being practically lost to the world. It was in this same year that his famous «Müller-lieder» were composed, consisting of musical settings to Wilhelm Müller's poems, a copy of which he had borrowed from his friend Randhartinger when visiting him.

The rejection of his opera 'Fierabras' in 1824 filled him with distress, from which however he was aroused by the quiet joys of his second stay with the family of Count Esterhazy at Zselész. During these happy days he probably wrote his lovely string quartet in A minor and the 'Divertissement à la Hongroise' for four hands, as well as several other pieces already mentioned.

Some of his best compositions in 1826 were the string quartet in D minor and G, the 'Rondeau brilliant,' as well as the sonata in G major, which Schumann regarded as his «most perfect work both in form and composition.» The number of pieces published in that year was very large, showing that a popular demand for his music had arisen, but nevertheless Schubert was always poor, partly because his profits were so small, and partly because he allowed himself to be imposed upon by his friends.

The year of 1827 was notable as the one in which Beethoven died. He and Schubert had not been intimate, and the latter's visit to Beethoven in 1822 had ended disastrously, for on looking over the 'Variations' Beethoven had pointed out something which astonished him, whereupon Schubert is said to have lost his self-control and to have rushed from the room. In April of this year was written the beautiful 'Nachtgesang im Walde' for four men's voices and four horns, and a spring song for men's voices. In this year he was elected a member of the Musical Society of Vienna, which gave him considerable satisfaction.

The last year of Schubert's life, 1828, was remarkable for the number of his compositions, among which, writes Grove, were «his greatest known symphony (in C), his greatest and longest Mass, his first Oratorio, his finest piece of chamber music, three noble pianoforte sonatas, and some astonishingly fine songs.» On 26 March he gave his first evening concert in the hall of the Musik-Verein. The program was very attractive and the applause great. In the month before he died he wrote a new 'Benedictus' to one of his Masses, wind-accompaniments to his 'Hymn to the Holy Ghost,' a long scena for a soprano voice, and a song entitled 'Die Taubenpost,' which is thought to have been his last composition. He was buried, in accordance with his dying wishes, in the Ortsfriedhof in the village of Währing, and in a grave only separated by two others from the one which held the remains of Beethoven.

Schubert's most prominent characteristics were truthfulness, honesty, good-humor and a cheerful, contented disposition. With his intimates he was entirely at ease, genial and even boisterous at times, but at a fashionable gathering he was shy and silent. Of his musical genius no better description can be given than in the words of Liszt: «He was the most poetical musician that ever was; and the main characteristics of his music will always be its vivid personality, fullness and poetry. In the case of other great composers, the mechanical skill and ingenuity, the very ease and absence of effort with which many of their effects are produced, or their pieces constructed, is a great element in the pleasure produced by their music. Not so with Schubert. In listening to him one is never betrayed into exclaiming 'how clever'; but very often, 'how poetical, how beautiful. how intensely Schubert.'» Consult Ferris, 'The Great German Composers' (1878); Kreissle von Hellborn, 'Franz Schubert, eine biographische Skizze' (1861–65; Eng. trans. 1869); Reissmann, 'Franz Schubert, sein Leben und seine verse' (1873); Barbedette, 'Franz Schubert, Sa vie, ses œuvres, son temps' (1866); Frost, 'Schubert' (1888).

SCHUCHERT, shŭk'ĕrt, **Charles,** American palaeontologist: b. Cincinnati, Ohio, 3 July 1858. He received a common school education, but possessing a natural aptitude for scientific investigation he early began a collection of fossils and the study of palaeontology. He was assistant to different experts in 1885–91; and in 1891–92 assisted in the geological survey of Minnesota. He was preparator of fossils with Dr. C. E. Beecher at Yale in 1892–93; served on the United States Geological Survey in 1893–94; and from 1904 to 1923 he was professor of palaeontology and Yale professor of the history of geology at Sheffield Scientific School, and curator of the geological collections at Peabody Institute. Author of 'Textbook of Geology'; 'Historical Geological Paleograph of North America'; 'Revision of Paleozoic Stelleroida, with Special Reference to North American Asteroida' (1915). Died, 21 Nov. 1942.

SCHULMAN, shool'man, **Samuel,** American rabbi: b. Russia, 14 Feb. 1864. He came to America as a child, was graduated at the College of the City of New York in 1885 and studied at the University of Berlin in 1885–89. He was rabbi at Helena, Mont., in 1890–93; at Kansas City, Mo., 1893–99; 1899–1927 rabbi of Temple Beth-El (now Emanu-El), New York. He was a member of the board of editors for the English translation of the Bible for the Synagogue; a contributor to the 'Jewish Encyclopedia'; and is author of articles on religious topics.

SCHULTZ, shŭlts, Sir **John Christian,** Canadian administrator: b. Amherstburg, Ontario, 1 Jan. 1840; d. Winnipeg, 13 April 1896. He was educated at Oberlin College, Ohio; Queen's University, Kingston; and at Victoria University, Cobourg, taking his M.D. in 1860. He then engaged in practice at Winnipeg (then Fort Garry), also becoming interested in the fur trade and editing the *Nor'wester,* the first newspaper of the region. He led the Canadian

party at the time of Louis Riel's first uprising (1869–1870), was taken prisoner, and sentenced to death by Riel. Having escaped, he continued his political career, became a member of the North West Council (1872), a member of the Dominion Parliament (1871–1882), a Dominion senator (1882–1888), and from 1888 to 1895 lieutenant governor of Manitoba. In 1895 he was knighted.

He was interested in railway and telegraphic development and in colonization, and was for many years a member of the Dominion Board of Health for Manitoba.

SCHULTZ LAKE, lake, Northwest Territories, Canada, in the central Keewatin District, is 35 miles long and 11 miles wide, with an area of 110 square miles. It is drained by the Thelon River, which flows into Baker Lake.

SCHULTZE, shŏŏlts, **Carl Emil** (pseudonym BUNNY), American cartoonist: b. Lexington, Ky., May 25, 1886; d. New York, N. Y., Jan. 18, 1939. He was educated at Lexington and at Cassel, Germany, began drawing for newspapers, and under the name of "Bunny" created the popular *Foxy Grandpa* series of comic pictures published in the New York *Herald* (1900–1902) and the New York *American* (from 1902). Most of them were republished in a series of *Foxy Grandpa* books. From 1923 to 1927 he was president of the International Feature Service of the New York *Evening Journal.* He is the author of *Vaudevilles and Other Things* (1900) and *The Adventures of Foxy Grandpa* (1900).

SCHULTZE, shŏŏl'tsĕ, **Max Johann Sigismund,** German anatomist: b. Freiburg, Germany, March 25, 1825; d. Bonn, Jan. 16, 1874. A professor at Halle University (1854), Schultze became in 1859 director of the anatomical institute at Bonn. His research was mainly in the microscopic examination of protoplasm, protozoa, and cells, and in the nerve endings of eye, ear, and nose. His discoveries contributed to a new understanding of the structure and functioning of the cell. With others, he was a founder in 1865 of *Archiv für Mikroskopische Anatomie.*

SCHULTZE-NAUMBURG, -noum'bŏŏrĸ, **Paul,** German architect and writer: b. Naumburg, Germany, June 10, 1869. After studying at the Kunstakademie in Karlsruhe, Schultze-Naumburg went to teach art in Weimar (1893), where he became one of the new Secessionists (q.v.), an advanced group in art. He wrote *Studium und Ziele der Malerei* (*The Study and Aims of Painting,* 1900) to explain the movement, but he was never considered a true Secessionist. He turned to painting his own Thuringian countryside attempting to make an imaginative reconstruction rather than an exact reproduction. Twilight was his favorite painting light. Next he became interested in applied art, and was in the forefront of his time. He wrote *Häusliche Kunstpflege* (*The Study of Domestic Art,* 1902), explaining that articles for domestic use were artistic if they perfectly expressed their function. His next phase was his most famous. He became a decorative artist, making all his pictures part of the decorative treatment of a room.

SCHULZ or **SCHULTZ,** shŏŏlts, **Johann Abraham Peter,** German organist, conductor, and composer: b. Lüneburg, Germany, March 31, 1747; d. Schwedt, June 10, 1800. At 15 Schulz left home to study with Johann Philipp Kirnberger in Berlin. As accompanist and music instructor to the Polish Princess Sapieha, he traveled through Europe in 1768, returning to Berlin in 1773. From 1776 to 1778 he was orchestral conductor in the French theater in Berlin, and for seven years (1780–1787) in the private theater of Prince Henry of Prussia. The king of Denmark liked his incidental music to Jean Baptiste Racine's *Athalie* so much that he invited Schulz to be court conductor at Copenhagen (1787–1795). He wrote not only operas, oratorios, music for plays, and large numbers of songs, but also a book on musical theory. It is his settings to contemporary poems that are considered of lasting value.

SCHULZ, Leo, American cellist: b. Posen, Germany, March 28, 1865; d. La Crescenta, Calif., Aug. 12, 1944. His musical education was at the Berlin Hochschule. He gave his first public recital at the age of five and appeared as a professional performer in 1876. By 1885 he was first cellist in the Berlin Philharmonic Orchestra and in 1886–1889 in the Gewandhaus Orchestra at Leipzig. He was a member of the Boston Symphony Orchestra in 1889, thereafter of the New York Philharmonic Society for many years, during which he also taught at the National Conservatory and conducted its orchestra. From 1904 to 1915 he was a member of the Margulies Trio. Among his compositions were chamber music, a cello concerto and other pieces for cello, a cantata, and songs.

SCHULZE-DELITZSCH, shŏŏl'tsĕ dā'-lĭch, **Hermann** (in full FRANZ HERMANN SCHULZE-DELITZSCH), German lawyer, politician, and economist: b. Delitzsch, Germany, Aug. 29, 1808; d. Potsdam, April 29, 1883. After legal courses at Leipzig and Halle, he entered the Prussian public service, and, except for a period of 10 years, was a member of the Prussian legislature from 1848 until his death. His energies were devoted, among other things, to bettering the lot of laborers, artisans, and small tradesmen. Toward this end he organized mercantile and consumers' cooperatives and founded the "people's banks," in which the members elected the managerial boards and received credit and dividends in proportion to their deposits. In 1859 more than 200 such banks were centrally organized under the direction of Schulze-Delitzsch, and at the time of his death there were in Germany alone 3,500 branches, with more than $100 million in deposits. The system spread widely in Europe.

SCHULZE-GAVERNITZ, Hermann Johann Friedrich von, German legal scholar: b. Jena, Germany, Sept. 23, 1824; d. Heidelberg, Oct. 28, 1888. Appointed professor at Jena in 1850, he transferred to Breslau seven years later, and taught at Heidelberg from 1878. His most important works were *System des deutschen Staatsrechts* (1865) and *Das preussische Staatsrecht . . .*, 2 vols. (1872–1877). He was ennobled in 1888.

GERHART VON SCHULZE-GÄVERNITZ (1864–1943), his son, was professor of economics at Freiburg from 1893 to 1926, and sat in the Reichstag as a member of the Progressive People's Party (1912–1920, 1922). He was the author of a number of works on English economic and social history.

SCHUMACHER, shōō'mȧ-kĕr, **Fritz,** German architect and city planner: b. Bremen, Germany, Nov. 4, 1869; d. Hamburg, 1947. Schumacher lived abroad with his family until 1884, when they returned to Bremen. He studied at the Munich and Berlin technical schools. From 1895 to 1899 he was an architect for Leipzig; then professor of architecture at Dresden Technical High School (1899–1909); and director of city planning in Hamburg (1909; 1924–1939), which he made into a modern city. Brick construction was his distinctive form. He was responsible for city planning in most of the great German cities, and designed schools, parks, and municipal buildings. He wrote *Das Wesen des neuzeitliche Backsteinbaus* (1920); *Strömungen in deutscher Baukunst seit 1800* (1935); and *Der Geist der Baukunst* (1938).

SCHUMACHER, Heinrich Christian, Danish astronomer: b. Bramstedt, Holstein, then a part of Denmark, Sept. 3, 1780; d. Altona, Dec. 28, 1850. Schumacher studied law at the universities of Kiel and Göttingen and taught at Dorpat, but a change of interest took him to Göttingen again to study astronomy. In 1810 he was given a teaching post at Copenhagen, in 1813 became a director of the Mannheim Observatory, and in 1815 was made professor of astronomy and director of the observatory at Copenhagen. But most of his time was given to the observatory the king had built for him (1823) at Altona, near Hamburg. Though he accomplished a good deal of distinguished work in astronomy during his lifetime, he is best known today for the important scientific periodical *Astronomische Nachrichten,* which he launched in 1821 and which still has an international circulation.

SCHUMACHER, Hermann, German economist: b. Bremen, Germany, March 6, 1868. The brother of Fritz Schumacher (q.v.), he also lived abroad, and received his early education in New York City; but he went to the Bremen Gymnasium and the universities of Freiburg, Munich, Vienna, and Berlin. The Imperial Chancery made him a grant to study the American cereal trade, and he published a book on the subject (1895). He was sent on a commission to study industrial conditions in Asia; in 1899 he became professor at the University of Kiel; in 1901 director of the Cologne School of Commerce; in 1904 professor at Bonn; and in 1917 at Berlin. Among his works are books on the tariff, on industry, American finance, socialism, international trade, and international problems. He was the first German exchange professor at Columbia University (1906).

SCHUMACHER, Kurt Ernst Karl, German politician: b. Kulm (now Chelmno, Poland), Pomerania, West Prussia, Oct. 13, 1895; d. Bonn, Germany, Aug. 20, 1952. A student in law at Münster when World War I broke out, Schumacher served only six months before losing his right arm. He continued to study for a doctorate at Munich while working at the ministry of labor in the Weimar Republic. He organized disabled veterans and became the leader of the Social Democratic Party (SPD), editing its paper, *Schwäbischen Tagwacht.* From 1924 to 1931 he was a member of the Prussian Diet, and from 1930 to 1933 deputy from Württemberg to the Reichstag.

His opposition to the Nazis put him in a concentration camp in 1933, where he stayed until 1942, released because of ill-health. When the war ended he was well enough to continue his political activities, and obtained permission from the British West Zone officials to revive the Social Democratic Party. It soon became the second political group in West Germany. In 1946 he was chosen party chairman. He agitated for a unified Germany free from any foreign entanglements, and lost the elections in 1949 by a very small margin. In 1948 his leg was amputated, as a result of his treatment in the prison camp.

SCHUMACHER, shōō'măk-ŭr, town, Ontario, Canada, in the northeastern part of the province, two miles east of Timmins. It is in a gold-mining region. Pop. (1951) 3,002.

SCHUMAN, shōō'măn, **Frederick Lewis,** American political scientist and writer: b. Chicago, Ill., Feb. 22, 1904. After serving as instructor (1927–1932) and as assistant professor (1932–1936) of political science at the University of Chicago, Schuman became professor of political science at Williams College in 1936 and Woodrow Wilson professor of government in 1938. He has been visiting professor at many universities, a lecturer and contributor to magazines, foreign broadcaster for the Federal Communications Commission (1942–1943), and a fellow of the Foundation for World Government (1950–1951). Among his published works are *International Politics* (1933; 5th ed. 1953); *The Nazi Dictatorship* (1935); *Night Over Europe* (1941); *Soviet Politics* (1946); and *The Commonwealth of Man* (1952).

SCHUMAN, shōō'măn, **Robert,** French statesman: b. Luxembourg, Grand Duchy of Luxembourg, June 29, 1886. He spent his early years in Lorraine, then a province of Germany, attended German universities, and began the practice of law in Metz. Because he refused to serve in the German Army in World War I, he spent the war years in a German prison. In 1919, when Lorraine was returned to France, he was elected a deputy from Moselle to the French Chamber. In 1940 the Vichy government made him under secretary of state for refugees, but he was arrested by the Gestapo in September. He managed to escape. One of the founders of the MRP (Mouvement Républicaine Populaire), he was elected deputy for the party in 1945. He became finance minister in 1946 and again in 1947, and in November of that year was chosen premier. Strikes were settled in a few weeks, but he lost power in July 1948 over his military budget. In August he again became premier—to serve until September. He next headed the French delegation to the United Nations General Assembly. From 1948 to 1952 he was foreign minister in all cabinets, but refused to serve in the cabinet of Pierre Mendès-France because of the chamber's refusal to ratify EDC (European Defense Community), which he ardently supported. In 1950, while foreign minister, he sanctioned the European Coal and Steel Community (q.v.), unofficially called the Schuman Plan. In February 1955 he became minister of justice in the cabinet of Edgar Faure.

SCHUMAN, William, American composer and teacher: b. New York, N. Y., Aug. 4, 1910. Schuman was graduated from Columbia University in 1935, and after studying with the American teachers Charles Haubiel, Max Persin, and Roy Harris, went to Salzburg to the Mozarteum Academy. Upon his return he taught at Columbia in the summer session (1936) and at Sarah Lawrence

College (1935–1944). He was awarded two Guggenheim Fellowships for composition (1939–1940; 1940–1941); the first Pulitzer Music Prize (1943) for his *Secular Cantata No. 2, A Free Song* (1942); the first Town Hall-League of Composers Award (1942) for *Spring Quartet No. 3*, and numerous other awards. *American Festival Overture* (1939) was given its first performance by the Boston Symphony Orchestra; *Prayer in Time of War* (1943), a first performance by the Pittsburgh Symphony Orchestra; *William Billings Overture* (1943) by the New York Philharmonic Orchestra. His ballet *Undertow* was performed by the Ballet Theatre Company at the New York Metropolitan Opera (1945). In 1945 he became president of the Juilliard School of Music.

Consult Schreiber, F. R., and Persichetti, V., *William Schuman* (New York 1954).

SCHUMAN PLAN, The. See EUROPEAN COAL AND STEEL COMMUNITY.

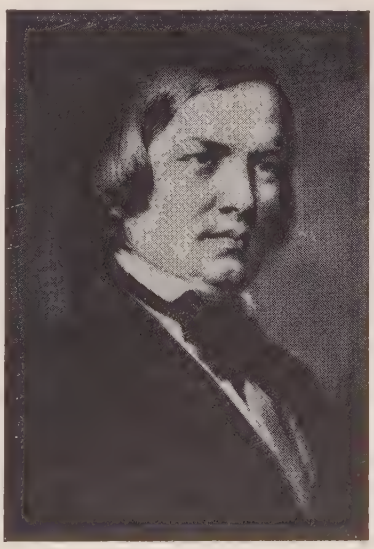
SCHUMANN, shōō'män, **Clara Josephine** (nee WIECK), German pianist and composer: b. Leipzig, Germany, Sept. 13, 1819; d. Frankfurt am Main, May 20, 1896. The daughter of the pianist Friedrich Wieck, from whom she received instruction for 15 years, she took part in a public concert for the first time in her ninth year. Her musical development was furthered by a concert tour with her father through the musical centers of Germany and France (1831–1832). She was the first to bring Frédéric Chopin's works to the notice of the German public. In 1840 she married Robert Schumann (q.v.), and shared his work and European successes until his death in 1856. Thereafter she pursued her public career alone, devoting much of her effort to furthering recognition of his genius. In 1878 she was appointed principal teacher of the pianoforte in the conservatory at Frankfurt am Main, where she remained until her retirement (1892).

SCHUMANN, Georg (Alfred), German composer, violinist, organist, and conductor: b. Königstein on Elbe, Germany, Oct. 25, 1866; d. Berlin, May 23, 1952. His father and grandfather, musicians also, taught him to play the violin and the organ, on both of which he performed as a child. From 1881 to 1888 he studied at the Leipzig Conservatory. He was conductor of a choral society at Danzig (1891–1896); director of the Philharmonic Orchestra and choir at Bremen (1896–1899); professor and head of the Berlin Singakademie (1900); head of the composition school of the Academy of Arts (1913). His choral works include *Amor und Psyche, Totenklage,* and *Sehnsucht;* his *Symphony in B minor* won a prize, and his oratorio *Ruth* was given at the Sheffield Festival in 1911. He also composed chamber music and works for orchestra, piano, and organ.

SCHUMANN, Maurice (pseudonym ANDRÉ SIDOBRE), French journalist and political leader: b. Paris, France, April 10, 1911. Between 1932 and 1940 Schumann was with the Havas News Agency in London. At the beginning of World War II he became a broadcaster for the British Broadcasting Company's French service, and from D-Day 1944 until the liberation of Paris he was liaison officer with the Allied Expeditionary Forces. Chosen a member of the French Provisional Consultative Assembly of November 1944–July 1945, he served in the Constituent Assembly in 1945 and in 1946. He was chairman of the Mouvement Républicain Populaire (MRP), deputy in the National Assembly (1951), and secretary for foreign affairs. A contributor of editorials to *L'Aube*, the Paris daily, he also published *Le germanisme en marche* (1938); *Mussolini* (1939); *Honneur et Patrie* (1946).

SCHUMANN, Robert, German composer: b. Zwickau, Saxony, Germany, June 8, 1810; d. Endenich, near Bonn, July 29, 1856. His father, who encouraged him in his career, was a bookseller and an author of some note. Robert engaged in a desultory study of law at Leipzig and Heidelberg, and by the age of 16 had finished a novel. But the youth who had written for the orchestra at the age of 12 and had turned out numerous compositions thereafter, including songs written to his own words, could now thwart his genius no longer. At 20 he began serious study of the piano under Friedrich Wieck, who already had instructed him, and Heinrich Dorn. An unwisely chosen method of his own, intended to free the fourth finger, resulted in the crippling of one of the fingers of his right hand. He had to give up any idea of becoming a pianist, and thenceforward devoted himself to composition. In 1834 he assisted in founding, and until 1844 edited, a musical journal, *Die Neue Zeitschrift für Musik*, for advancing the art and emancipating it from old-fashioned methods and from French and Italian influences. Convinced that German art had not yet reached its full development, he said: "Consciously or unconsciously, a new and as yet undeveloped school is being founded on the basis of the Beethoven-Schubert romanticism, a school which we may venture to expect will mark a special epoch in the history of art."

Meanwhile Schumann was busy composing in a variety of forms. In 1833 he published his first *Impromptus* (Op. 5). In this year, too, he began his *Sonata No. 1 in F minor* (Op. 11). A turning point was reached in his life in October 1835 when Felix Mendelssohn and he met at a musical gathering at Wieck's. A strong intimacy seems to have grown up between them. Schumann declared that Mendelssohn was the greatest living musician and that he seemed like a "high mountain peak." Mendelssohn saw in Schumann only the literary man and art critic, but it is significant that when, in 1843, Mendelssohn established the Leipzig Conservatorium, Schu-



Robert Schumann.

mann was appointed teacher of playing from score. While there he introduced the use of the piano with pedals as a preparation for playing the organ.

Schumann's marriage in 1840 to Clara Wieck, daughter of his old teacher, was apparently a very happy one, and the fact that he soon afterward began to compose love songs does not weaken this belief. At the same time his wife regarded it as her greatest privilege to interpret his compositions faithfully to the public, nor was it long before she became the leading woman pianist of Germany. In the year after his marriage he paid more special attention to symphonic work, composing three entire numbers, only one of which, however — in B♭ — was published at that time. He also wrote the first movement of the 'Pianoforte Concerto in A minor.' In 1842 Schumann accompanied his wife on a concert tour to Hamburg. The latter proceeded alone from there to Copenhagen, while he returned to Leipzig. Later they visited Bohemia and met Prince Metternich, at whose invitation they went to Vienna. In 1844 they traveled to Russia, Madame Schumann giving concerts in several of the large cities; but Schumann, who loved the quiet of domestic life, was always impatient to return home.

The style of Schumann's compositions underwent a decided change in 1843, the principal work of the year being 'Paradise and the Peri,' for solo voices, chorus and orchestra. It was first performed on 4 December, and was conducted by Schumann in person. He also composed his popular 'Variations' for two pianos (op. 46), and from this time his reputation in Germany was firmly established. Thus encouraged he began in the following year the second of his two most famous choral works consisting of a musical setting to Goethe's 'Faust.' About this time he gave up the editorship of his paper and changed his residence to Dresden, where he at first lived in seclusion on account of his nervous condition, resulting doubtless from overwork. In 1845–46 he composed his 'Studies' and 'Sketches' for the pedal-piano, as well as his famous 'C major Symphony,' first produced by Mendelssohn at the Gewandhaus in Leipzig, 5 Nov. 1846. In Dresden he met Richard Wagner, for whose work he expressed great admiration, but on account of their very different natures they were never in close sympathy. The former was high-spirited and talkative, while Schumann, always reserved, was growing more and more silent. The idea of the improvement of German operatic music, long a favorite subject with Schumann, now led him to write an opera. He chose as his subject the legend of Saint Geneviève, but only after long and irritating delays was the first performance of 'Genoveva' arranged. This took place on 25 June 1850 under Schumann's own direction. The criticisms of this first attempt at dramatic work were on the whole unfavorable, and it is said that he derived far more gratification from the reception accorded to his music of 'Faust.' He also wrote an excellent musical setting for Byron's 'Manfred,' which had its first performance in Weimar 13 June 1852.

While living in Dresden he undertook the direction of the Liedertafel, and in 1848 he established a choral society. Two years later he accepted the position of municipal director of music at Düsseldorf. Here he had the direction of a vocal organization and an orchestra. His duties were sufficiently light, however, to leave him ample time for social enjoyment, in which he took great pleasure. His generous nature was manifested by his arrangement of a series of concerts, some of which were devoted wholly to the works of other living composers. This was in line with his desire to aid in advancing the interests of those less famous than himself. As a conductor Schumann was not regarded as a success. His lack of presence of mind and of sympathy with the players was conspicuous and contributed largely to his unpopularity as a leader. This unfortunate condition of things, combined with the return of a brain affection, symptoms of which had been first manifested as far back as 1833, at length made it necessary for him to resign his post, which he did in 1853. During his residence in Düsseldorf the number of his compositions was very great, including the celebrated 'E♭ Symphony,' which, it is believed, was intended to convey by musical expression the impressions he received during a visit to Cologne. It was first performed on 6 Feb. 1851, almost exactly three years before that sad day when, in a state of utter mental distraction, he sought to end his life by jumping into the Rhine. He was saved by some boatmen, but unmistakable signs of insanity soon appeared, although for a brief period later his mind became wonderfully calm and clear, and with it returned his old love of work. His mental powers were shattered, however, and the last two years of his life were spent in an asylum at Endenich. He was buried at Bonn. A monument over his grave was unveiled on 2 May 1880.

Schumann's works present a rare combination of passion and tenderness. He did much for the development of piano-playing and his numerous songs reveal the grandeur and depth of his unselfish nature. His compositions consist of orchestral works, vocal works with orchestral accompaniment, choruses, a large number of songs, chamber music and also many pieces for the organ and piano. Striking features of Schumann as a composer are his originality and his cautious approach to the more difficult classes of work. At the outset of his career he chose simple forms, building several together for his longer pieces. From this method, however, resulted no unevenness or inharmoniousness, a fact which bears strong witness to the greatness of his creative abilities. In the composition of songs Schumann must be conceded to take rank with such composers as Schubert and Mendelssohn. As one of his biographers writes: "Schubert shows the greatest wealth of melody, Mendelssohn the most perfect roundness of form; but Schumann is by far the most profoundly and intellectually suggestive."

Until Schumann reached his 30th year he wrote almost entirely for the piano, and his method of treating the instrument must be regarded as strictly original. He followed none of the methods of the older composers, although he was evidently familiar with their work. His earlier compositions strike the hearer as the result of sudden impulses and, therefore, contain much that is apparently at variance with the established laws of art, but this in no wise detracts from, but rather adds

to, the freshness and originality of their conception.

His symphonies are generally regarded as the most important contributions of this class since the time of Beethoven, whom he approached quite nearly at times, and whose works occasionally served as his models. His love for sacred music was developed only a few years before his death. In writing to a friend in 1851 he said: «It must always be the artist's highest aim to apply his powers to sacred music. But in youth we are firmly rooted to the earth by all our joys and sorrows; it is only with advancing age that the branches stretch higher, and so I hope that the period of my higher efforts is no longer distant.» Several compositions of this class are recorded, one of the most famous being op. 71, an Advent hymn for solo, chorus and orchestra; op. 93, a motet for men's voices; op. 144, a New Year's hymn for chorus and orchestra; his 'Mass,' op. 147, and a 'Requiem,' op. 148. These, while not counted among his greatest works, nevertheless were grandly conceived. For list of Schumann's works see catalogue of Schuberth & Co., 1860–61, and supplement to 'Musikalisches Wochenblatt' (Leipzig 1875). R. I. GEARE,
National Museum, Washington, D. C.

SCHUMANN-HEINK, Mme. Ernestine, nee **Rössler,** opera and concert singer: b. Lieben, near Prague, Bohemia, 15 June 1861; d. Hollywood, Calif., 17 Nov. 1936. Her father was an Austrian army officer; her mother, an Italian. She was educated at the Ursuline Convent, Prague; sang in the convent choir at 11; studied under Marietta von Leclair at Graz, 1874; appeared as soloist with the Academischer Gesangverein, 1876; later studied with Krebs-Michalesi and Franz Wüllner, Dresden; made operatic debut there, 1878; sang in Berlin, 1887; sang at all performances of the 'Ring' at Bayreuth, 1896–1906 (except 1904); joined Berlin Opera, 1898, with permission to sing in America during the winters; made American debut at Chicago, 7 Nov. 1898; and New York debut with the Metropolitan Opera Co., 9 Jan. 1899, her success being so great she purchased the release of her Berlin contract. First extended American concert tour made, 1903–04; sang in concert and opera in Europe, 1908–09; created role of Clytemnestra in Strauss' 'Elektra' at Dresden. After retiring from the Metropolitan, she devoted most of her time to concert work for many years, giving about 100 recitals annually. Her operatic répertoire included about 150 roles. Late in life she was frequently heard over the radio. She was regarded as the greatest contralto of her time, and was a noble character. She was thrice married. During the World War she had sons fighting in both the German and American armies. One was killed on each side. She became an American citizen in 1905.

SCHURMAN, shoor'man, **Jacob Gould,** American educator and diplomat: b. Freetown, Prince Edward Island, 22 May 1854. He was descended from a Dutch family which, in the 17th century, settled in New Holland, now New York, where his grandfather was born. Educated in the provinces, he received the Dominion Gilchrist Scholarship in 1875 and studied later at London and Edinburgh universities. He was elected to the Hibbert traveling fellowship in 1878 and spent two years at Heidelberg, Berlin and Göttingen, mainly occupied with the study of philosophy. In 1880 he became professor of philosophy and English literature at Acadia College, Nova Scotia, and in 1882 removed to a similar post at Dalhousie College. In 1886 he became professor of philosophy at Cornell University; in 1890 he was made dean of the Sage School of Philosophy there; and from 1892 until he resigned in 1920 he was president of the university. President McKinley appointed him to head the first United States Philippine Commission, and he was joint author of its report (4 vols. 1900). He was Minister to Greece and Montenegro, 1912–13; first vice-president of the New York State Constitutional Convention, 1915; Minister to China, 1921–25; and Ambassador to Germany, 1925–30. He wrote 'Kantian Ethics and the Ethics of Evolution' (1881); 'The Ethical Import of Darwinism' (1888); 'Agnosticism and Religion' (1896); 'A Generation of Cornell' (1898); 'Philippine Affairs—A Retrospect and Outlook' (1902); 'The Balkan Wars' (1912–13); 'Why America is in the War' (1917). He held honorary degrees from various universities. Died, New York City, 12 Aug. 1942.

SCHURZ, shoorts, **Carl,** German-American publicist, editor and author: b. Liblar, near Cologne, Prussia, 2 March 1829; d. New York City, 14 May 1906. He studied at the University of Bonn, in 1848 with others published a revolutionary journal, in 1849 escaped to the Palatinate upon the failure of an insurrection which he promoted at Bonn, took part in the defense of Rastadt and upon its surrender fled to Switzerland. In 1850 he returned to Germany, going thence to Scotland and to Paris, where he was a correspondent for the German press, and, after a year in London, came to the United States (1852), where until 1855 he resided in Philadelphia. Having then removed to Madison, Wis., he identified himself with the Republican party, and by his speeches made himself an important factor in determining the German element of the State against slavery. He participated in the Lincoln-Douglas senatorial canvass in Illinois, entered legal practice at Milwaukee, was a member of the National Republican Convention of 1860 and assisted largely in the framing of its platform. During the ensuing campaign he spoke much in both German and English. He was appointed by Lincoln Minister to Spain, but in December 1861 resigned to enter the army, receiving a commission as brigadier-general of volunteers. He distinguished himself at the second Bull Run (Manassas), was promoted major-general, 14 March 1863, commanded a division at Chancellorsville, held temporary command of the 11th corps at Gettysburg and took part at Chattanooga. After the war he returned to professional practice, in 1865–66 was Washington correspondent of the New York *Tribune,* and was made by President Johnson a special commissioner to report on the workings of the Freedmen's Bureau. In 1868 he was temporary chairman of the convention that nominated Grant, whom he actively supported in campaign. In 1869–75 he was senator from Missouri. He vigorously opposed many of the leading measures of the Grant administration, in 1872 helped to organize the «Liberal» party and presided over the Cincinnati convention which nominated Greeley, but in 1876 supported Hayes, by whom he was made Secretary of the Interior. He introduced competitive examinations for posts

in the civil service, and provided for forest protection on public domains. From the close of the administration to 1884 he was editor of the New York *Evening Post*. His speeches and contributions to periodicals were numerous and able. A statue of him has been erected on Morningside Drive at 116th street, New York City.

SCHUTZSTAFFEL (SS), a body of German troops which grew out of the Adolph Hitler headquarters guard called Sturmabteilung (SA), a group of professional hoodlums and bouncers organized in 1923. The Schutzstaffel, which, literally translated means "protective echelon," was more familiarly known during World War II as the Elite Guard. It began its real expansion in 1929 under the leadership of Heinrich Himmler, who defined its purpose "to find out, to fight, and to destroy all open and secret enemies of the führer, the National Socialist movement, and our racial resurrection."

Himmler's aim was to restrict enlistments to perfect physical specimens of pure Aryan stock traced back for 200 years. These were to have become "the fathers of the new Germany."

In 1933 the Schutzstaffel was divided into three groups, one of which, the SS-Verfugungstruppe (SS-VT), developed into the Waffen-SS. These were the fighting SS: organized into regular army divisions with the finest equipment available, given the most intensive and detailed training, and placed in the line for only specialized assignments. Their arrogance and superior attitude led to ill-feeling with Wehrmacht troops, and their allegiance to Himmler resulted in disunity of command in many sectors.

They fought with ruthless fanaticism and eventually won the fear and hatred of even their own people. Upon acceptance into the Schutzstaffel, a man was tatooed on the under side of the upper arm with the lightning SS insignia. This identified them to Allied troops as war criminals and accounted in part for their reluctance to surrender.

At least five SS divisions were fully trained by the time Poland was invaded in 1939, and by 1942 an estimated 750,000 men had been enlisted by the SS.

SCHUVALOFF, shoo-vä'lŏf, **Peter Andreievitch,** COUNT, Russian diplomat: b. Saint Petersburg, Russia, July 15, 1827; d. there, March 22, 1889. He entered the army, and rose to the rank of general at 30. He was head of a department in the Ministry of the Interior in 1862, governor of the Baltic provinces in 1864–1866, and in the latter year was appointed chief of the secret service. He was sent to London in 1873 as special ambassador and arranged the marriage between the daughter of Alexander II and the duke of Edinburgh. In 1878, he was a representative at the Congress of Berlin. As ambassador to England, he was instrumental in preserving friendly relations between Great Britain and Russia after the Russo-Turkish War of 1877–1878. Prince Gortschakoff was displeased with his concessions and recalled him from London. Thereafter he took no part in public affairs.

SCHUYLER, Eugene, American diplomat: b. Ithaca, N. Y., Feb. 26, 1840; d. Cairo, Egypt, July 18, 1890. He was graduated from Yale in 1859 and from Columbia Law School in 1863. After practicing law, he entered the diplomatic service in 1866, was consul at Moscow and Reval and secretary of legation at Saint Petersburg, 1870–1876. In 1876, he was transferred to Constantinople and that year, after careful investigations, rendered an important report on the Turkish massacres in Bulgaria. In 1878, he was consul at Birmingham; the next year, consul general at Rome; and in 1880, chargé d'affaires and consul general at Bucharest. In 1881, the United States government authorized him to arrange and sign the commercial and consular treaties with Rumania and Serbia, and in the following year he assumed toward those two countries and Greece the post of minister-resident and consul general.

SCHUYLER, Louisa Lee, American social worker, great-granddaughter of Gen. Philip Schuyler and of Alexander Hamilton: b. about 1838; d. Highland Falls, N. Y., Oct. 10, 1926. She was a member of the United States Sanitary Commission in the Civil War and one of the organizers and an officer of the New York State Charities Aid Association, founded in 1873. In 1874, she originated the first American training school for nurses at Bellevue Hospital against the protest of a considerable share of the management, which grudgingly allotted six wards for its practice field. In 1907 she was appointed a trustee of the Russell Sage Foundation. She received in 1915 an honorary LL.D. from Columbia University in recognition of her great public service.

SCHUYLER, Philip John, American soldier: b. Albany, N. Y., Nov. 20, 1733; d. there, Nov. 18, 1804. He was the second son of John Schuyler, owner of a large estate near Albany. He served in the French and Indian War in two campaigns (1755 and 1758), first as captain and afterward as commissary with the rank of major. In 1761, he went to England to settle the colonial claims. Returning in 1763, he successfully engaged in the lumber business at Saratoga. He built the first flax mill in America. In 1764, he acted as a boundary commissioner to determine the line between New York and Massachusetts and later helped settle the New Hampshire boundary. In 1768, he was chosen as Albany's representative in the colonial assembly where he earnestly defended the side of the colonists. In 1775, he was a delegate to the Continental Congress and served on the committee to frame rules and regulations for the Continental Army. He was appointed major general June 19, 1775 and placed in command of the department of northern New York, with headquarters at Albany. He planned to invade Canada and proceeded as far as Lake Champlain, where he left Gen. Richard Montgomery in command of Fort Ticonderoga, while he returned to Albany to raise more troops and forward supplies. Early in 1776, he led an expedition to Johnstown, N. Y., where he captured the military stores of the British. Owing to a clash with Gen. Horatio Gates he offered his resignation (Sept. 14, 1776), which Congress would not accept. In 1777, he was appointed chief of the Pennsylvania militia and in June was again placed in command in northern New York. On July 4, 1777 Ticonderoga was evacuated by Gen.

Arthur St. Clair. Despite a masterful retreat, Schuyler was superseded by Gates on August 4. At his own insistence, General Schuyler was tried by court-martial for alleged neglect of duty in permitting the capture of Fort Ticonderoga. He was acquitted and completely vindicated in 1778. The following year he resigned from the army but remained on the Board of Indian Commissioners. In 1779–1780 he was again a delegate to the Continental Congress and in 1780 he also was chairman of a committee at Washington's headquarters concerned with reorganizing staff departments of the army and unifying forces with the French. He entered the New York State senate in September 1780 and held public office continuously until 1798. Schuyler actively supported the successful campaign of the Federalists to secure New York State ratification of the Constitution in 1788. With Rufus King (q.v.), he represented New York in the first United States senate in 1789–1791 and was re-elected in 1797 to serve until his retirement due to ill health in 1798. He married Catherine Van Rensselaer September 17, 1775 and had eight surviving children. His daughter Elizabeth became the wife of Alexander Hamilton.

Consult B. J. Lossing, *The Life and Times of Philip Schuyler* (1860–1873) and Bayard Tuckerman, *The Life of General Philip Schuyler* (1903).

SCHUYLERVILLE, skī'lēr-vĭl, N. Y., village in Saratoga County; altitude 139 feet; about 32 miles north of Albany; on the Saratoga and Schuylerville Railroad. It is a tourist resort, with many historical associations and monuments in and near it. Its original name, Saratoga, is retained in the name of Saratoga Springs, famous resort ten miles to the west. The first settlement on the site, made in 1689, was burned in an Indian raid, in 1745. The restored village was incorporated under its modern name in 1831, and was named in honor of Gen. Philip Schuyler (q.v.), who planned the campaign against Burgoyne. Located on the direct line of traffic from the Hudson to Lake Champlain and Canada, this region was at the center of a field of vital action in the early years of the revolution. The Battle of Saratoga is commemorated by a lofty monument housing collections of revolutionary relics. A niche on each face of its square base preserves the memory of an American of the time: those of Generals Schuyler and Gates and Colonel Daniel Morgan (q.v.) with statues, and that of Benedict Arnold with an empty space. The battlefield site, about eight miles south of the village, was set apart in 1948 as Saratoga National Historical Park. Pop. (1950) 1,314.

SCHUYLKILL, skōōl'kĭl (from the Dutch word *schuilkil* meaning "hidden channel"), a river in Pennsylvania which has its rise in Schuylkill County, flows southeast and enters the Delaware River at Philadelphia. The total length is about 131 miles. Philadelphia obtains a large part of its water supply from the Schuylkill. The industrial cities of Pottsville, Reading, Pottstown, and Norristown developed along its banks.

SCHUYLKILL HAVEN, Pa., borough in Schuylkill County; altitude 526 feet; on the Schuylkill River; 5 miles south of Pottsville; on the Pennsylvania, Lehigh, and Reading railroads. Manufactures shoes and textiles. Pop. (1940) 6,518; (1950) 6,597.

SCHWAB (shwŏb), **Charles Michael,** American industrialist: b. Williamsburg, Pa., Feb. 18, 1862; d. New York City, Sept. 18, 1939. His father moved to Loretto, Pa., in 1867, and there Charles Schwab grew up, attended the village school and later St. Francis College. There also he first drove a mail coach to Cresson, Pa., then worked in a grocery store in Braddock, Pa., before he started out as a stake driver in the engineering corps of the Edgar Thompson Steel Works, part of the growing properties of the Carnegie Brothers, later to become part of the Carnegie Steel Company, Ltd. In 1881 he was made chief engineer and assistant manager of the plan. In 1887 he was made superintendent of the Homestead Steel Works, another Carnegie property, and in 1889 he returned to the Thompson Works as general superintendent. In 1892 he was made general superintendent also of the Homestead Works, and in 1897 was made president of the Carnegie Company. Four years later, when the Carnegie properties were combined with the Morgan interests to form the United States Steel Corporation, he was made president of the new company. In 1903 he resigned and shortly after became head of the Bethlehem Steel Corporation which he developed into one of the great industrial concerns of the world. In 1913 he became chairman of the board. In 1918 he served as director general of shipbuilding, United States Shipping Board, Emergency Fleet Corporation. After the armistice he returned to the directorship of Bethlehem Steel, a position which he held until his death in 1939. He also was a director of the Metropolitan Life Insurance Company and president of the American Iron and Steel Institute. Mrs. Schwab, the former Miss Emma Eurana Dinkey of Loretto, died in January 1939.

SCHWAB (shväp), **Gustav,** German writer: b. June 19, 1792 at Stuttgart; d. there, Nov. 4, 1850. With Uhland and Werner he was a leading disciple of the Swabian school of poetry. His light poetry, romances and life of Schiller (1840) are memorable. Aside from anthologies of German prose and lyric poetry, his published works include a book of verse entitled *Der Bodensee* (1827); *Die Schönsten Sagen des Klassischen Altertums* (3 vols. 1838–1840); and *Die Deutsche Volksbucher,* 3 vols. (1836 ff.).

SCHWANN, shvän, **Theodor,** German physiologist: b. Neuss, Dec. 7, 1810; d. Cologne, Jan. 11, 1882. He studied at Cologne, Bonn, and Würzburg and graduated in medicine at Berlin in 1834. There he became the assistant of Johannes Müller (q.v.) and in this capacity discovered pepsin (q.v.) about 1836. He also demonstrated important researches on putrefaction and fermentation which influenced the work of Pasteur and Lister. Muscular contraction and nerve fibers were two of his other fields. In 1838 Schwann became professor of anatomy at Louvain, and in 1848 at Liége. His most important work was the origin of the cell theory later developed by Rudolf Virchow (q.v.). In 1839 he published his celebrated *Microscopic Investigations on the Accordance in the Structure and Growth of Plants and Animals,* translated into English in 1847. Here he points out that both animals and plants are made up of elementary units, the cells. See also Cell.

SCHWANTHALER, shvän'tä-lēr, **Ludwig**

von, German sculptor: b. Munich, Aug. 26, 1802; d. there, Nov. 14, 1848. He studied in Munich and in Italy. After returning to Munich from his first trip to Rome in 1826 he set up a studio, and began executing statues and bas-reliefs for royal palaces and museums built by King Ludwig I of Bavaria. Early in his career he did decorative work for the gallery facing the glyptotheca, and 25 marbles commemorating painters for the Old Pinakothek. From 1832 on he received numerous commissions and in 1835 he was appointed professor in the Munich Art Academy. He executed 12 gilded, bronze figures 10 feet high of Bavarian princes for the throne room in the palace at Munich. His work for the Hall of Fame (Ruhmeshalle) included the colossal, 60-foot figure of *Bavaria* and ninety-two metopes. For the Walhalla in Regensburg he executed pediment groups. Notable among his portrait statues are *Shakespeare* in the Munich theater, *Goethe* in Frankfurt am Main, *Mozart in Salzburg,* and the *Emperor Rudolf* in the cathedral at Spires. Starting out as a neo-classicist, he later developed into a romanticist. The Schwanthaler Museum in Munich contains his models and studies which he willed to the Munich Art Academy.

SCHWARTZE, Teresa, Dutch painter: b. Amsterdam, Dec. 20, 1852; d. there, Dec. 23, 1918. She studied first under her father, Johan Georg Schwartze (1814–1874) and then in Munich and Paris. She excelled in portrait painting, her work being memorable for its fine character drawing, strong handling, and rich coloring. Two of her best pictures, a portrait of Piet J. Joubert and a genre painting entitled *Three Inmates of the Orphanage at Amsterdam,* are in the Ryks Museum in Amsterdam. Also notable is *The Orphan* in the Boyman Museum, Rotterdam.

SCHWARZ, shvärts, **Karl,** German Protestant theologian: b. on Isle of Rügen in the Baltic, Nov. 19, 1812; d. March 25, 1885. He studied theology and philosophy at Halle, Bonn, and Berlin. His advanced political opinions interrupted the progress of his career several times. In 1837 he spent six months in prison and in 1845 he was suspended from lecturing at Halle. However, he later advanced with such honors as the appointments of professor extraordinarius at Halle in 1849 and chief court preacher in 1858. Schwarz was one of the founders and leaders of the German Protestant Union and a champion of liberal theology. His writings include *Das Wesen der Religion* (1847) in which may be observed the influence of Hegel and Friedrich Schleiermacher, and an important source for the history of theology in Germany entitled *Zur Geschichte der neuesten Theologie* (1856, 4th ed., 1869).

SCHWARZENBERG, von, fŏn shvär'tsĕnbĕrĸ, princely Austrian family including:

Prince Felix, Statesman, b. Krumlov, Bohemia, Oct. 2, 1800; d. Vienna, April 5, 1852. After aiding in the suppression of popular uprisings in Italy in 1848, he became prime minister of a reactionary Austrian government, 1848–1852. He forced the abdication of Ferdinand and put Francis Joseph on the throne as emperor. Shortly after, in 1849, he dissolved the Kremsier Reichstag and the same year suppressed popular insurgents in Hungary. In 1850 Schwarzenberg restored the old federal diet, a diplomatic triumph for Austria at the expense of Prussia. He also caused Francis Joseph to suspend what remained of the constitution in 1851.

Prince Karl Philipp, Austrian prince and soldier: b. Vienna, April 15, 1771; d. Leipzig, Germany, Oct. 15, 1820. He began his military career in the imperial cavalry in 1788, and later served with distinction in the battles of Hohenlinden (1800), Ulm (1805), and Wagram (1809). After the Peace of Vienna he was Austrian ambassador to Paris where he made negotiations for the marriage of Napoleon to the archduchess Maria Louisa in 1810. At Napoleon's request he commanded the Austrian contingent in Russia in 1812, and was created a field marshal. However, when Austria joined Russia and Prussia, Prince Schwarzenberg commanded the allied forces, gained the battle of Leipzig in 1813 and led the victorious armies into Paris.

Consult Prokesch-Osten, *Denkwürdigkeiten aus dem Leben des Feldmarschall's Fürsten Schwarzenberg* (1823) and Berger, *Das Fürstenhaus Schwartzenberg* (1866).

SCHWATKA, shwŏt'kà, **Frederick,** American Arctic explorer: b. Galena, Ill., Sept. 29, 1849; d. Portland, Oreg., Nov. 2, 1892. He was graduated from West Point in 1871, and, while serving as a second lieutenant at army posts in the United States, he studied both medicine and law. From 1878–1880 he and William Henry Gilder, of the New York *Herald,* headed an expedition to King William Island, Northwest Territories, in search of records and remains of Sir John Franklin's Arctic exploring party. During their search they made a sledge journey of 3,251 miles, the longest then on record. They succeeded in locating many graves and some wreckage of the lost expedition and also established the fact that Franklin's records were undoubtedly lost. Schwatka next explored the course of the Yukon River in Alaska, 1883–1884. The following year he resigned his army commission to devote himself to exploring, writing, and lecturing. He headed the New York *Times'* Alaskan expedition of 1886 and later went to Chihuahua in northern Mexico where he investigated the Tarahumarí Indians. He was the author of *Along Alaska's Great River* (1885); *Nimrod in the North* (1885); *The Children of the Cold* (1886); and *In the Land of Cave and Cliff Dweller* (1893).

Consult W. H. Gilder, *Schwatka's Search* (1881).

SCHWEINFURT, shvīn'fo͝ort, German city in Lower Franconia, Bavaria, on the Main, 66 miles east of Frankfurt am Main. First mentioned in 791, it was made an imperial city in 1282. The city has a Gothic church with a tower and a 16th century Renaissance town hall. Aside from being a river port and agricultural trading center, it manufactures ball bearings, chemical products, dyes and soap. During World War II it was heavily bombed by Allied planes before being taken by American forces on April 12, 1945. Pop. (1939) 49,560.

SCHWEINFURTH, shvīn'fo͝ort, **Georg August,** German traveler in Africa: b. Riga, Dec. 29, 1836; d. Berlin, Sept. 20, 1925. He was educated at Heidelberg, Munich, and Berlin. From 1863–1866 he circled the Red Sea, is said to have traversed the region between the Red Sea and the Nile, from thence journeyed to

Khartoum, and finally returned to Europe. In 1869 he started on an expedition through the interior of East Africa, exploring the countries inhabited by the Bongo, Dinka, Diur (Dyoor), Niam-Niam, and Mangbettu (Monbuttu) peoples. His discovery of the Akka Dwarf proved the existence of pygmies in Africa. In 1870 he discovered the Uele (Welle) River in the Belgian Congo. His next expedition (1873–1874) took him into the Libyan Desert with Gerhard Rohlfs. The following year he settled in Cairo to devote himself to his African studies, and at intervals, from 1876 to 1888, he explored the Arabian Desert. Among his published works are *The Heart of Africa* (Eng. ed., 1873) and *Artes Africanae; Illustrations and Descriptions of Productions of the Industrial Arts of Central African Tribes* (1875).

SCHWEINITZ, shwī'nĭts, **George Edmund de**, American ophthalmologist: b. Philadelphia, Pa., Oct. 26, 1858; d. there, Aug. 22, 1938. After graduation from Moravian College in 1876 he took his M.D. at the University of Pennsylvania in 1881, and was professor of ophthalmology at that university from 1902 until 1924; in 1922–1923 he was president of the American Medical Association. Schweinitz is known for his work on the prevention of blindness. Among his books is *Diseases of the Eye* (1892, 10th ed. 1924).

SCHWEINITZ, Lewis David von (or de), American Moravian clergyman and botanist: b. Bethlehem, Pa., Feb. 13, 1780; d. there, Feb. 8, 1834. In 1798 he went to Germany where he studied theology and entered the Moravian ministry. He returned to the United States in 1812 as general agent of the Moravian Church at Salem, N. C., and in 1821 he was appointed administrator of the church's northern province with headquarters at Bethlehem, Pa. An enthusiastic botanist, he added about 1,200 new species to the catalogue of American flora. His valuable collection of plants he left to the Philadelphia Academy of Natural Sciences. He published, among other studies, *The Fungi of North Carolina* (1818) and *A Synopsis of North American Fungi* (1831). His son, Edmund Alexander de Schweinitz (1825–1887), was a Moravian bishop and historian; a grandson, Emil Alexander de Schweinitz (1866–1904), was a noted biochemist.

SCHWEITZER, shvī'tsĕr, **Albert**, Alsatian medical missionary, philosopher, Protestant theologian, and musician: b. Kaysersberg, Alsace, Jan. 14, 1875. His father, a Lutheran minister, moved the family to the Alsatian village of Günsbach where Albert attended the local school. After completing his secondary schooling in Münster and the gymnasium at Mulhouse, he went to Paris in the summer of 1893 to take lessons from the eminent organist Charles Marie Widor, with whom he later edited (1912–1914) J. S. Bach's organ music. From the autumn of 1893 to 1899 Schweitzer studied theology and philosophy at the universities of Strasbourg, Paris (Sorbonne), and Berlin. He then became a preacher in the Church of St. Nicholas, Strasbourg, while working for his licentiate in theology which he received in 1900. In 1903 he was appointed principal of the university's theological college, and in 1905 he published his authoritative biography of *Johann Sebastian Bach* in French (Eng. ed., 1911), which was soon followed by *The Quest of the Historical Jesus* (1906, Eng. trans. 1910), the book which first brought him international regard.

At the age of 30, he decided to devote himself to "the direct service of humanity" and accordingly he took up the study of medicine at the University of Strasbourg in 1905. In 1911 he received his medical degree and two years later sailed for Gabon, French Equatorial Africa, to set up a native hospital at Lambaréné. His wife, the former Hélène Bresslau, whom he married in 1912, accompanied him as a nurse. Before they were interned as enemy aliens in 1914, the Schweitzers treated some 2,000 native patients during their first nine months in Africa. During his internment Schweitzer worked on his book, *The Mysticism of Paul the Apostle,* published in 1930 (Eng. ed., 1931; rev. ed., 1953). The next few years he toured Europe giving concerts and lectures to support his humanitarian work at Lambaréné. In 1923 the first two volumes of his philosophical work were brought out: *The Decay and Restoration of Civilization* and *Civilization and Ethics;* later published in one volume in a revised American edition as *Philosophy of Civilization* (New York 1949). This work, starting with a theoretical pessimism in attempts to find a scientific explanation of the world, develops his own ethical optimism or "reference of life." After 1924 Schweitzer divided his time between work at Lambaréné, building up his hospital units and native practice, and intermittent European lecture tours.

In 1928 he received the Goethe Prize of ten thousand marks from the city of Frankfurt, Germany. The 1952 Nobel Peace Prize was awarded to him on Oct. 30, 1953.

Other books of his, most of them translated into English, include *The Religious Philosophy of Kant* (1899); *Psychiatric Study of Jesus* (1913; Eng. trans. 1948); *Paul and His Interpreters* (1911; Eng. ed., 1912); *On the Edge of the Primeval Forest* (1921; Eng. ed., 1922); *Memoirs of Childhood and Youth* (1924); *Out of My Life and Thought* (1931; Eng. trans. 1933; rev. ed. 1949); *Indian Thought and its Development* (1935; Eng. ed., 1936); *From My African Notebook* (1939); *Goethe: Four Studies* (1949); *Animal World: Jungle Insights into Reference for Life* (1950).

Charles Rhind Joy edited in 1947 *Albert Schweitzer: An Anthology* (rev. ed. London 1952), followed by *Wit and Wisdom of Albert Schweitzer* (Boston 1949), and *Music in the Life of Albert Schweitzer* (Boston 1951).

Consult Seaver, George, *Albert Schweitzer: Christian Revolutionary* (New York 1944); Hagedorn, H., *Prophet in the Wilderness* (New York 1947); Kraus, Oskar, *Albert Schweitzer: His Work and His Philosophy* (New York 1947); Seaver, George, *Albert Schweitzer: The Man and His Mind* (New York 1947); Joy, C. R. and Arnold, M., *The Africa of Albert Schweitzer* (Boston 1948); Ratter, M. C., *Albert Schweitzer: Life and Message,* rev. American ed. (Boston 1950); and Mozley, E. N., *Theology of Albert Schweitzer* (New York 1951).

SCHWELLENBACH, shwĕl'ĕn-bäk, **Lewis B(axter)**, American public official: b. Superior, Wis., Sept. 20, 1894; d. Washington, D.C., June 10, 1948. Admitted to the Washington state bar in 1919, he began practice in Seattle where he became partner of a law firm in 1925. In 1935 he was elected to the United States Senate from the State of Washington, and in 1940 he resigned to become United States district judge of the Eastern District of Washington. Judge Schwellenbach succeeded Frances Perkins as secretary of labor in President Harry S. Truman's cabinet in 1945.

SCHWENKFELD, shvĕngk'fĕlt, **Kaspar von,** German Protestant theologian and Silesian nobleman: b. Silesia, 1489; d. Ulm, Dec. 10, 1561. He entered the service of the duke of Liegnitz and was influential in spreading the principles of the Reformation in Silesia. However, he differed from Luther on several points of theology, chiefly on the sacrament of the Eucharist, and was opposed by both Protestants and Catholics. After the publication of a book in 1539, which set forth his distinctive doctrine of the deification of Christ's humanity, he was actively persecuted by the Lutherans. The following year he published an enlarged statement of his views in a book entitled *Grosse Confession.* After Schwenkfeld's death in 1561, a sect called the Schwenkfeldians perpetuated his views, including the rejection of Lutheran sacraments. His followers were subjected to greater or less persecution and finally in 1720, when a commission of Jesuits was sent into Silesia to convert them, many fled to Holland, England, and North America. In 1734 a group emigrated to Philadelphia, Pa., and formed a community known as Schwenkfelders which still exists in Pennsylvania today. They maintain a few small churches which appear to resemble those of the Society of Friends.

SCHWENKFELDIANS. See RELIGIOUS SECTS.

SCHWERIN, shvâ-rēn', Germany, capital of the former state of Mecklenburg, picturesquely situated on the southwest shore of Lake Schwerin, 20 miles south of the Baltic and 129 miles by rail northwest of Berlin. It is a railroad junction and has an airport. In addition to Lake Schwerin, which is 14 miles long and three wide, a number of smaller lakes surround the town. Among other notable structures, it contains a former grand ducal castle, French Renaissance in style, built in 1844–1857 on a small island; a Gothic cathedral which dates for the most part from the 15th century; a library; an arsenal; and a museum. It manufactures lacquered wares, machinery, cloth, tobacco and beer. The town was first mentioned in 1018 and received civic rights in 1166. Pop. (1939) 64,639.

SCHWIND, shvĭnt, **Moritz von,** German painter: b. Vienna, 1804; d. Munich, 1871. Starting out with little formal training in his youth, Schwind went to Munich in 1827 and in 1834 he received a commission to decorate a room in King Ludwig II's new palace, later known as the Tieck room. In 1844 he moved to Frankfurt am Main where he painted the *Singer's Contest in the Wartburg* two years later. He became a professor at the Munich Art Academy in 1847. Among his other works are a series of wall paintings for the Hohen-Schwangau Castle in the Bavarian Tirol, another series for the Wartburg Castle, and three great water color cycles. His illustrations of Goethe and other poets brought him much popularity. Part of his genius lies in his sense of humor and deep sensitivity to beauty. Schwind is considered a master of the German late-romantic school.

SCHWYZ, shvēts, Switzerland, capital of the canton of Schwyz; altitude 1,706 feet; three miles from Brunnen, its port on the Lake of Lucerne. Included among points of interest in this picturesque Swiss town are the 16th century town hall, a handsome 18th century parish church and some interesting old houses. The town is chiefly a tourist center and its inhabitants are German-speaking. Pop. (1930) 8,256.

SCIACCA, shäk'kä, Italy, a seaport town and bishop's see in southwest Sicily, in the province of Agrigento, 30 miles northwest of Agrigento. Walls built about 1550 still surround the town which has two ruined castles, medieval and 18th century palaces, several interesting churches, and a convent. Hot sulfur and ferruginous springs are located nearby. Pop. 22,713.

SCIAENIDAE, sī-ĕn'ĭ-dē, a family of percomorphous, spiny-rayed teleostomous fishes, in which the body is usually slightly compressed and elongated and covered with thin, slightly ctenoid scales. The head is scaly and its superficial bones are remarkable for the extensive development in them of passages for the mucous canals. The fins are well developed and there are not more than two spines. The air bladder is generally a specialized structure; it is by forcing air through this organ that the peculiar grunting and rumbling sounds produced by these fishes are caused. Most of the species are marine and littoral, but a few are fresh-water. Most of them feed upon other fish but some upon crustaceans and mollusks. The family is an extensive one represented by a variety of species with world-wide distribution. They are especially numerous along the sandy shores of warm seas, and many of them are good food and game fish. Weakfish, drumfish, croakers, kingfish and spot belong to this family.

SCIATICA, sī-ăt'ĭ-kạ, a painful neuritis of the sciatic nerve, which is the chief nerve of the back of the thigh and leg. It is characterized by extreme pain, often excruciating and occurring in paroxysms, and increased by any change of temperature and moisture; there is stiffness and generally swelling of the limb at the beginning of the disease, but after repeated attacks the limb seems to shrink, owing to the wasting of the muscles. In some cases the articulation of the hip seems affected, and permanent immobility of the limb takes place. Mild attacks are often called neuralgia of the sciatic. In all cases very careful examination of the pelvis and the bones of the lower part of the spinal column should be made, and all causes for chronic poisoning sought for. It is a very chronic condition. See NEURALGIA; NEURITIS.

SCIDMORE, sĭd'mōr, **Eliza Ruhamah,** American traveler and author: b. Madison, Wis., Oct. 14, 1856; d. Nov. 3, 1928. She joined the National Geographic Society in Washington, D.C. in 1890, and later became its corresponding secretary, associate editor, foreign secretary and member of the board of managers. She traveled widely through Europe and the Orient. Her published works include *Alaska: Its Southern Coast and the Sitkan Archipelago* (1885); *Jinrikisha Days in Japan* (1891); *Java: the Garden of the East* (1897); *China, the Long-Lived Empire* (1900); *Winter India* (1903) and *As The Hague Ordains* (1907).

SCIENCE, History of.—If one defines science as systematized positive knowledge (or what has been taken as such at different ages and in different places), then the history of science is the description and explanation of the development of that knowledge. For example, considering all that we know today in astronomy, how did we obtain that knowledge? It is a very long story which takes us back to prehistoric times when men began to observe the sun, moon, stars, planets—and wondered. Our knowledge of today has been reached only after taking an infinity of steps and false steps.

If one bears in mind that the acquisition and systematization of positive knowledge is the only human activity which is truly cumulative and progressive, one realizes at once the importance of these studies. Should one wish to account for the progress of mankind, one must focus one's explanation upon that activity, and the history of science in this broad sense becomes the keystone of all historical investigations.

Brief Outline.—The definition will be clarified if we illustrate it with an outline of the way the scientific experience of mankind was gradually developed until it reached its present depth and complexity. The reader must be warned, however, that this is not a history of science but simply a general view of it, enough to give him some awareness of the many kinds of investigations which are involved.

Any history must begin with an account of the dawn of science. This is a part of anthropology and prehistory. How did early men invent and fashion their tools? How did they domesticate animals and learn the tricks of husbandry? How did they obtain the rudiments of arithmetic, geometry, astronomy? How did they find the best foods for health and the best drugs for sickness? How did they learn to navigate the waters, to hunt and fish, to lift and transport heavy stones, to dig for ores and smelt them, to make bronze implements and later iron ones? How did they discover the ways of social life in families and tribes, the methods of economy and government? How did they develop a language and means of recording it? Did they achieve a kind of social or historical consciousness, and if so, how did they gratify it? How were artistic and religious needs awakened in them and what did they do to obey them?

These are but a few of the innumerable questions which must be answered in order to understand the level of knowledge which man had attained before the curtain of recorded history rises. The earliest cultures represented by written documents occurred in Egypt, Mesopotamia, India, and China, and an account of these cultures cannot be given without the collaboration of orientalists able to decipher and to interpret those documents. Historians of science must manage to extract from the studies of orientalists all the data pertinent to their own quest and to explain them.

After many vicissitudes and the violent upheaval caused by the discovery and use of iron weapons, a gifted nation, the Greeks, tried to explain the universe and themselves in a deeper way. The earliest of those Greeks were settled along the western coast of Asia Minor, in Sicily and south Italy. We owe them the elements of mathematics, astronomy, mechanics, physics, geography, medicine. Few of their writings have been preserved and what we know is derived from fragments and indirect quotations.

The golden age of Greek science coincided with the golden age of Greek literature and art. Its main center was Athens; the language, Greek; the time, 5th and 4th centuries B.C. The 5th century witnessed great philosophers such as Democritus and Leucippus, who invented the atomic theory, mathematicians like Hippocrates of Chios, astronomers like Philolaus, and physicians like Hippocrates of Cos, "the father of medicine." That golden century was brought to a close by the political murder of Socrates in 399 B.C.

The 4th century was even richer in scientific achievements and it was dominated by two philosophers, two of the greatest personalities of their kind in the whole past: the first half of the century was dominated by Plato, founder of the Academy of Athens; the second half by Aristotle, founder of the Lyceum in the same city. So far-reaching was the influence of these men that to this day every thinking man, every scientist, may be said to be either a Platonist or an Aristotelian.

The political ruin of Greece caused such deep changes all around that scholars are agreed in using a new name to designate the new culture which developed chiefly from the 3d century B.C. on. The center was no longer in Athens but in Alexandria and other Greek cities outside of Europe. The new culture was no longer called Hellenic but Hellenistic. It is immortalized by the deeds of 3d century anatomists like Herophilus and Erasistratus and of mathematicians and astronomers like Euclid, Aristarchus, Archimedes, Eratosthenes and Apollonius, the last three flourishing in the second half of that century, and Hipparchus in the late 2d century B.C. The end of the Hellenistic age merged with the Roman age because Rome had become the political master of the Greek world just before the Christian era began. Roman science was but a reflection of the Greek; a few scientific books were written in Latin, however, by Lucretius, and Cicero, in the 1st century B.C., and in the succeeding 1st century A.D. by Celsus, Pliny, and Frontinus. Yet, until the 7th century, all the outstanding names are Greek, the two greatest of all being the 2d century astronomer and geographer Ptolemy and the physician Galen—two giants dominating the golden age of the Roman Empire with Greek writings. Later appear more mathematicians and astronomers like Diophantus and Pappus (3d century), Theon of Alexandria in the 4th, and in the 5th his daughter Hypatia, and Proclus; philosophers like Philoponus and Simplicius (6th century); physicians like Oribasius (4th century), Aetios and Alexander of Tralles in the 6th, and Paulus Aegineta in the 7th century. This has brought us to the time of the Moslem conquest of a great part of the Mediterranean world.

It is impossible to describe here even in briefest manner all the vicissitudes of medieval history. From the 9th century to the 11th, all of Greek knowledge was translated into Arabic and the best new scientific books were written in Arabic. After the 11th century, the whole was gradually retranslated into Latin, and to a smaller extent into Hebrew. The greatest physician of the early Middle Ages was the 11th century ibn-Sina (Avicenna) and the most original scientist was his contemporary al-Biruni. The leading mathematicians and astronomers of that period (9th to 11th century) were all writing in Arabic—al-Khwarizmi, al-Farghani, and al-Battani in the 9th century, Abul-Wefa in the 10th, Omar Khay-

yám and al Zarqali in the 11th—as were the leading philosophers, the 9th century al-Kindi, al-Farabi (10th), and ibn-Sina and al-Ghazzali, both 11th century. Arabic culture was international, extending from the far west (Spain and Morocco) to India; it was interracial and interreligious, for it included not only Moslems but also Jews and Christians. The common features were the Arabic language and the Islamic culture it served to express.

Later medieval thought was dominated by three giants, the Moslem ibn-Rushd (Averroes), the Jew Maimonides (both 12th century), and the 13th century Christian, St. Thomas Aquinas.

The greatest events of the 15th century were the invention of typography about the middle of it and the geographical discoveries initiated by Henry the Navigator and reaching a climax at the end of the century with Columbus and others. These geographical discoveries continued during the 16th century and increased immeasurably human experience in many directions.

The discovery of printing did not mean simply a far greater diffusion of ideas than had been possible before, but also the production of *standard* texts and a little later *standard* illustrations. For the first time the progress of knowledge could be registered forever as soon as it was made, standardized and transmitted to every corner of the civilized world. Until that period East and West had worked together, but the Moslem East, increasingly inhibited by religious obscurantism, rejected printing and ceased to cooperate with the Western world.

The discovery of printing was so pregnant that it is well to consider it the beginning of a new period, the so-called Renaissance, almost exclusively Western (as far as science is concerned). If we define the Renaissance as the period 1450 to 1600, we find that one of its main characteristics was the recovery of the texts of the Greek classics, most of which had been known only through Latin translations of Arabic translations. In other respects the Renaissance was essentially the continuation of the Middle Ages. There were a few giants like Leonardo da Vinci, Nicolaus Copernicus and Andreas Vesalius, Vannoccio Biringuccio and Rodolphus Agricola, Ambroise Paré and Pierre Belon, Konrad von Gesner, Tycho Brahe, William Gilbert and Simon Stevin, and rebels like Philippus Aureolus Paracelsus and Bernard Palissy, but modern science cannot be said to begin in earnest until the 17th century with such men as Francis Bacon, Galileo Galilei, Johannes Kepler, and René Descartes.

During the Renaissance printing shops had become very numerous and the number of printed books had increased immeasurably. The steady accumulation of knowledge was guaranteed. Another powerful means of controlling and recording the progress of science was the establishment of academies. The first academies of science date from the 17th century, the Accademia dei Lincei in Rome (1603–1630), the Accademia del Cimento in Florence (1657–1667), the Royal Society in London (1662), the Academie des Sciences in Paris (1666). The books and journals sponsored by those academies and a few other journals such as the *Journal des savants* of Paris (1665) and the *Acta eruditorum* of Leipzig (1682) guided the activities of men of science wherever they were working.

Almost all the leading scientists were fellows of at least one of these academies, and it would be possible to describe the development of science in innumerable directions on the basis of the academic publications. The main monuments of modern science, however, are the great treatises such as the *Principia mathematica* of Sir Isaac Newton (1687) (see PRINCIPIA), the *Traité de la lumière* of Christian Huygens (1690) and a great many others, too many to be listed.

In the 17th and 18th centuries the number of distinguished men of science is so great that an enumeration of them would be impossible. It is more interesting to point out that they were distributed all over Europe. It became clearer than ever that scientific activities are international; the history of science in any one country, however great, is very incomplete, because some of the essential work was done in other countries. Even such a small country as Switzerland produced its full share of scientific heroes: Paracelsus, Gesner, the Bernoullis, Albrecht von Haller, Leonhard Euler, Lambert, Steiner, and others. Young America started making her own gifts with Benjamin Franklin, John Winthrop, Benjamin Thompson (Count Rumford).

During the 19th century, science developed so fast and in so many directions, with almost incredible luxuriance, and yet with so much steadiness that even the best observers were deceived and became a little too optimistic. They believed that science was approaching a stage of perfection. Further progress would simply consist in obtaining an infinity of new data to complete the schemes of the naturalists, or in making physical measurements with greater precision and expressing results with more decimals. That peaceful and optimistic climate was upset toward the end of the century, when there began a series of inventions which changed radically the material conditions of life and caused the 20th century to be so completely different from the preceding ones that the whole past tends to be unified in our remembrance. Many people seem to believe that an entirely new world began in the 20th century, and they are not quite wrong.

Many of these fundamental inventions were not fully developed until the end of the 19th century, but then their growth was so rapid and their diffusion so intense that they have become essential parts of 20th century environment: dynamos, electric motors, telegraphs and telephones, internal combustion engines, phonographs, aviation, cinema, wireless, radio, television, methods of refrigeration, plastics (each of these words could easily be amplified into many volumes). The purely scientific discoveries have been equally revolutionary; they have upset many sciences as deeply as inventions have upset the ways of life. It will suffice to refer to the discovery of X-rays (Wilhelm Konrad Roentgen, 1895), radioactivity (Antoine Henri Becquerel, 1896), and psychoanalysis (Sigmund Freud, 1900 and after), to the rediscovery of Mendelism (1900), to the discovery of the theory of quanta (Max Karl Ernst Planck, 1901), theory of mutations (Hugo De Vries, 1901–1903), radium (Pierre and Marie Curie, 1903), special and general theories of relativity (Albert Einstein, 1905, 1916), and disintegration of the atom (Lord Ernest Rutherford, 1919).

History of Science and Science.—Men of science and technicians want to know the latest results; they consider previous ones as obsolete and disregard them. The historian of science, however, is interested not only in the newest

results but in the whole evolution which has led to them and made them possible. The latest results are like the new fruits of a tree; the fruits serve our immediate needs, yet without the tree the fruits could not come into being. The historian of science wants to know the tree of knowledge with all its roots and branches; he appreciates the fruits of today but not more so than those of the past and the future.

History of Science and History.—Since the 18th century at least, that is, since the time of Giovanni Battista Vico, Montesquieu, and Voltaire, the concept of history has become more and more comprehensive. At first, historians were concerned mainly with political and military history; they learned gradually to attach more attention to arts and letters, religion, and economics. Thus the old political history was transformed into something much broader which might be called the history of culture.

The historical field was extended also in a geographical way. Early historians (like the Jewish ones) were concerned only with the history of their own people; under Greek and Roman influence the geographical field was increased; but a great many centuries were to elapse before historians obtained a sufficient knowledge of all the nations (East and West) and included all of them in their conception of mankind or the scope of their own studies.

It was only in relatively recent times that the importance and centrality of the history of science was realized, and even today the great majority of historians do not realize it fully. There were a few pioneers beginning with the end of the 17th century (not to go back any further). Witness such men as the Swiss, Daniel LeClerc (1652–1722) and Albrecht von Haller (1708–1777); the Germans, J. C. Barkhausen (1666–1723), J. C. Heilbronner (1706–c.1747), Johann Beckmann (1739–1811), A. F. Hecker (1795–1850), Abraham Gotthelf Kästner (1719–1800), Johann Friedrich Gmelin (1748–1804); the English, John Freind (1675–1728), Joseph Priestley (1733–1804), Adam Smith (1723–1790); the Swedish, Olaf Celsius (1670–1756); the French, Jean Etienne Montucla (1725–1799) and Jean Sylvain Bailly (1736–1793).

But the first man to introduce this theme in a broader context and to increase its circulation was the French philosopher, Auguste Comte, who developed it in his *Cours de philosophie positive* (1830–1842). His views were discussed by another French philosopher, Antoine Augustin Cournot in 1861, but the real inheritor of Comte's thought and the first great teacher of the history of science was Paul Tannery (1843–1904). During the 20th century his example has been followed by many scholars in the leading countries. The history of science has become a full fledged discipline; yet the number of men who can devote their whole time to it is still very small.

History of Science and Philosophy.—One would expect philosophers to be specially interested in the history of science, because the philosophical implications of scientific work are not clear until one considers science in its growth. In order to understand a function, it does not suffice to consider only the last points in the curve which represents it; one must take into account the whole curve. On the other hand, the historian of science cannot accomplish his task satisfactorily unless he understands the philosophical implications of science. Many men of science were primarily inventors and technicians, avoiding philosophy; yet none grew up in a philosophical vacuum. Every scientist is influenced by the religious and philosophical conceptions of his time, whether he is aware of it or not.

Methods of Study.—The methods which the historian of science uses are necessarily the same as those used by other historians, but as they must be applied to scientific facts and theories, the historians of science must receive a scientific preparation as well as a purely historical one. It is impossible to understand and to appreciate scientific documents without adequate scientific knowledge. All the difficulties of the history of science stem from the necessity of a double education. Much bad work has been done by historians who did not know science and also by men of science who had no idea of historical methods, and did not even realize that such methods existed.

The main point is that knowledge of any kind is worthless unless it be as accurate as conditions permit. It is here that the conflict of methods appears. A physicist fully aware of all the difficulties of physical measurements may be trusted to do his best to overcome these difficulties; the same man is not aware of historical difficulties and of the need of historical precision.

The historian like the scientist must try to be as accurate as possible, yet must remember that the same degree of precision is not required in every case. For example, when the length of an object is mentioned, the unit varies with the needs; it may be expressed in microns, millimeters, yards, or miles; in the same way, it may be necessary to give the time and date of an event very exactly, say 9 A.M., March 21, 1591 (Gregorian); in other cases, it may suffice to say March 1591, or 1591, or "toward the end of the 16th century." All those expressions are accurate, though their degrees of accuracy vary considerably. To use a higher degree of precision than the circumstances warrant is a form of pedantry. On the other hand, when the historian is investigating any subject he should note the dates and other facts with as much precision as possible; it will be easy enough to diminish the precision in his account if needed, while the reverse procedure is impossible.

Historical methods are on the whole less tangible and more delicate than physical methods, and therefore more difficult to set forth. This is due to the fact that the subject matter of history is human and therefore capricious, even when we are dealing with the development of science. The reactions of a man of science are infinitely more complex than those of the objects he is studying. The methods required to investigate ancient, medieval, or oriental science are, of course, more complex than those needed to explain modern events. In the case of contemporary events, described in our own language, it is hardly necessary to study the background, which we know well enough, or to consider linguistic difficulties. On the other hand, when one tries to appreciate the trigonometrical facts included in Arabic books written in Baghdad in the 9th century, one must be able to evoke the culture of that place and period, understand the Arabic language and Islamic religion, and so forth. That kind of work is not simply historical but philological. The basis of it is always what the philologists call "the establishment of the text." That is (in this case), one must determine as exactly as possible what was written by al-Khwarizmi, by Habash

al-Hasib, by al-Battani; one must establish the text of their very words (either as written by themselves or quoted by others), and it is only after that has been done that their trigonometry ideas can be safely investigated. To assume that al-Battani may have written this or that is worthless and perverse.

The establishment of a text implies a very special and complex training. Philological and historical methods can be learned only through personal experience in their use, and that process of learning is never completed.

Teaching of the History of Science.—As the history of science is a new discipline, the teaching of it is very recent. The first professorship was established at the Collège de France in 1892, but the appointment of unqualified professors defeated the grand aim. Today, over 60 years later, in the writer's opinion university administrators have yet to appreciate (1) the importance of such studies; (2) the need of entrusting them to competent scholars equipped with the necessary training (scientific, historical, philosophical); (3) that such work, being difficult and still in the experimental stage, must be a full time occupation. Too often that teaching has been entrusted, as a kind of side job, to men who, however eminent in other science fields, were not qualified to teach the history of science.

The teaching of the history of science is organized fairly well, though in different ways, in various European and Asiatic universities, as London, Paris, Frankfurt-am-Main, Moscow, and Ankara, and in a few American universities as Harvard, Wisconsin, Cornell, Yale, Johns Hopkins, and Brown. It is possible in those universities to continue these studies up to the degree of Ph.D. Professional historians of science are still exceedingly rare.

History of Science vs. History of Particular Sciences.—It should be noted that the history of science as defined by Comte, Tannery, and the author of this article is essentially different from the history of particular sciences or of particular techniques. To consider technology first, the explanation of its development implies a large amount of economic or sociologic research. Inventions are made to answer definite needs, and each new invention of any importance creates new needs and causes an endless chain of other inventions. For example, the discovery of the first steam engine opened up an enormous branch of technology. Not only were those engines and their accessories gradually improved but their availability suggested new technical departures, such as railways, steamships, and an infinity of other machines. The historian of any branch of technology must be familiar with patent literature and with all kinds of industrial and commercial ramifications, even with legal problems with which the historian of science would hardly concern himself.

On the other hand, the historian of science must try to take into account every branch of science, and investigate their interrelationships which are frequent and complex. Indeed, his main purpose is to explain the development of the whole tree of science, a tree which never ceases to grow in its roots, trunk, and innumerable branches and twigs. He must explain how the progress of one science affected the progress of other branches. For example, the development of microscopes and telescopes implied the solution of physical and chemical problems and other technical difficulties; better microscopes influenced the progress of natural sciences, better telescopes accelerated astronomical progress and enabled us to conceive a universe (or universes) immeasurably larger than the universe of our ancestors.

As the historian of science is writing for scientists and learned men of every kind, he can never assume that the scientific knowledge of his readers is sufficient to understand the intricacies of any problem, and therefore his account should never be too technical. The historian of chemistry expects his readers to know chemical technicalities, but the historian of science cannot entertain the same expectations, for the majority of his readers are not chemists but physicians or physicists, naturalists, astronomers or mathematicians, philosophers or sociologists.

A general treatise on the history of science is thus less technical than one on medical or geological history, but what it loses on that side, it regains on another, because it is far broader. The historian of chemistry is more of a technician, the historian of science is more of a humanist; he is in the fullest sense the historian of mankind.

Diversity of Points of View.—The history of science being a field of endless complexity and incredible size, it would be very foolish to say "This is the way to study it or to teach it, and there is no other." There are many ways, many points of view, each of which is acceptable and useful, none of which is exclusive of the others. Some of the points of view have already been indicated. There is the point of view of the historian who wishes to understand as fully as possible the culture of a nation or of a period; the point of view of a professional man of science who would explore the origin and development of his own knowledge; the point of view of a man of letters who would include science in his survey, either because great men of science are, might, or should be distinguished authors, or because no writer can help having some kind of scientific background; the point of view of the philosopher whose main concern is to show the complex relationship between science and philosophy (how much either influenced the other). There are at least three other points of view also, the logical, psychological and sociological, which deserve to be examined more carefully.

Logical Point of View.—Logicians may be tempted to unravel the logical concatenation of scientific facts and to give a logical interpretation of discoveries. They are bound to be surprised by the results of their inquiries, for the chronological order of discoveries is often very different from the logical one. In science as in art "the wind bloweth where it listeth." What some people call the logic of science is largely casual and retrospective; it is nevertheless useful to bring it out. Discoveries are not always made in logical order, but it is worthwhile and helpful to explain them in that order.

The methods of teaching, which are logical enough, are almost the reverse of the methods of discovery. The teachers of a vast subject, say inorganic chemistry or theoretical mechanics, must put the fundamental notions first in spite of the fact that these notions may have been the very last to be discovered. The teachers are not concerned with the historical order; their main purpose is to explain science as simply and clearly as possible.

Psychological Point of View.—Another set of historians is interested in the individual aspects of scientific work, and ask themselves questions like the following: How did it happen that John Doe made such or such a discovery? Is it to be explained in rational or emotional terms? How does he compare with other scientists as a man, or with other men? How was his temper affected by work, rest or play, by success or failure? How was he influenced by his social environment, and how did he influence it? How did he express and reveal himself, or fail to reveal himself? What was the quality of his spirit? His love of truth, his love of beauty, his love of justice, his religion, to what extent were they developed? Or was he indifferent to the world around him, blind to everything except the narrow field of his research? Not only the psychologist but the humanist tries to answer such questions, and innumerable others.

Social Point of View.—Instead of considering men of science individually and trying to find the individual roots of their activities, one may consider them as members of a social group and investigate the social pressures to which they may have been submitted. According to the official Soviet philosophy, "dialectical materialism" (or "diamat" as it is called in eastern Europe), science is explained primarily, if not exclusively, in social and economic terms. There is a core of truth in such explanations, for science does not develop in a social vacuum and men of science are citizens, whom the state or their employers can use and abuse in many ways. Every man of science needs a modicum of food and other comforts in order to do his work; if called to arms and killed in battle, his activities come to an end; if he is a physicist or astronomer, his opportunities will depend upon the laboratory or observatory to which he has been admitted and his freedom will be limited by the good or bad will of administrators or fellow workers. Yet nobody can completely control his spirit; he may be helped or inhibited, but his scientific ideas are not determined by social factors. Honest men of science have often continued activities detrimental to their material interests. Historians of science should describe such conflicts as carefully as possible, thereby helping us to understand various forms of society and the psychology of exceptional men.

A vast literature devoted to the problems of the impact of society on science and of science on society may be classified under the general heading "Science and Society." A number of books *ad hoc* are listed in the present writer's *Horus* (pp. 94-97), but that list is incomplete and more books appear every day. Sociologists are tempted to restrict their interest in the history of science to these problems and their endless implications.

Theoretical and Practical Uses of the History of Science.—There are obviously many theoretical motives for studying the history of science. A man of science would study that history in order to throw light upon his own task and to increase his enjoyment of it; a philosopher, in order to relate science to philosophy and account for some variations of the latter; a psychologist, to explore the peculiarities and possibilities of the human mind; a sociologist, better to understand the many relationships between scientists and the social groups to which they belong.

The people who study a subject for theoretical reasons are probably exceptional; most students submit themselves to definite training for practical reasons. They wish to qualify themselves for a trade or profession. Looking at it from their angle, the study of the history of science will complete the training of scientific teachers (to teach well one needs a kind of perspective which can be obtained only by historical inquiries); it will improve the qualifications of students for many parascientific positions, such as those of librarians, editors, curators of museums, administrators, and other men having to deal directly or indirectly with scientific pursuits.

Bibliography.—There is no elaborate textbook covering the whole history of science from its prehistoric beginnings up to now. On the other hand, there are innumerable books dealing more or less completely with one branch of science, with one period, with one kind of people, or with one country. The best guide in that labyrinth is provided by Sarton, George, *Horus. A Guide to the History of Science* (Waltham, Mass., 1952).

A general account of the history of science as much as it can be put in one volume may be found in Singer, Charles, *Short History of Science to the Nineteenth Century,* to mid-19th century (Oxford 1941); Dampier, Sir William C., *History of Science,* 4th ed. (Cambridge, Eng., 1949).

Much more elaborate accounts are Thorndike, Lynn, *History of Magic and Experimental Science,* from the 1st to the 16th century, 6 vols. (New York 1923–41); Sarton, George. *Introduction to the History of Science,* from Homer to end of the 14th century, 3 vols. in 5 (Baltimore 1927–48); Sarton, George, *History of Science,* from prehistoric times to the end of the 4th century B.C., vol. 1 (Cambridge, Mass., 1952); Wolf, Abraham, *History of Science, Technology and Philosophy in the Sixteenth and Seventeenth Centuries* (new ed., New York and London 1951); id., *History of Science, Technology and Philosophy in the Eighteenth Century* (New York and London 1952).

Science has developed in so many directions and with such incredible exuberance in the 19th and 20th centuries that it has become almost impossible to cover it. Yet, see Darmstaedter, Ludwig, *Handbuch zur Geschichte der Naturwissenschaft und der Technik* (Berlin 1908), a list of discoveries in chronological order which requires 273 pages to cover the period 3500 B.C., to 1799, and 800 pages to cover the years 1800 to 1908; Lark-Horovitz, K., and Carmichael, Eleanor, *Chronology of Scientific Development, 1848–1948* (Washington, D.C., 1948), very short yet useful. The difficulties of writing the history of contemporary science are discussed by Sarton, George, "Remarks Concerning the History of Twentieth Century Science" *Isis,* vol. 26, pp. 53-62 (1936).

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SCIENTIFIC MANAGEMENT. Definition.—The term *scientific management* characterizes that form of organization and procedure in purposive collective effort which rests on principles or laws derived by the process of scientific investigation, experiment and analysis, instead of on tradition or on policies determined empirically and casually by the process of trial and error. The principal phases of scientific management are: (1) Exhaustive investigation of the elements usable in collective effort—manual and machine processes, materials, tools and equipment, physical and psychological operating conditions—and their reactions in all possible relations, in order to determine the combination which for any specific purpose is most economical in technical energy—human and material; the formulation of the results of such investigation in principles and laws, and the establishment on the basis of such principles and laws of standards of procedure and result; (2) the development and maintenance of such precise and automatic coordination and control of the collective effort as to accomplish, in accordance with the established standards of procedure and result, with

economy of energy and time, any purpose of the collective effort; (3) organization of the personnel, processes, materials and equipment in such functional cooperative relations as to bring to bear in the collective effort the highest available and developable technical skill in planning, supervision and execution. See also INDUSTRIAL ENGINEERING; INDUSTRIAL ORGANIZATION AND ADMINISTRATION.

SCIENTIFIC METHOD, an investigative procedure which involves the application of principles of logic to the solution of scientific problems. In its ease of adaptability to all of the sciences, logic becomes the common denominator and reasoning tool of scientific method, with observation and experiment the means of verification of the theories thus advanced.

The Scope of Scientific Method.—The expression "scientific method" may be regarded in one or other of two different areas of interpretation, namely: (1) In a restricted sense, it is the term applied to various modes of investigation by means of which specialized knowledge is acquired in fields of research concerned with physical or natural processes (for example: physics, chemistry, astronomy, geology, meteorology); (2) In a more general sense, the term scientific method may be applied to processes of establishing the truth of widely diverse propositions of seemingly nonscientific nature (for example: in the fields of sociology, business, economics, philosophy, or law) by resort to the demonstrative and deductive methods of science. In general, scientific method entails those processes of logical reasoning by which the aggregate of all truth is rigorously established.

Experimental Science and Logic Compared.—Experimental science as a whole is concerned with methods of measurement, qualitative and quantitative; the devising of conditions under which an unknown quantity may be most accurately and expediently observed. It furnishes the auxiliary tool, the instrumentality for setting up the conditions of an investigation and observing the resultant action. Hence experiment alone does not constitute an end, but only a means to discovering the end. It supplies the data which logic subsequently construes and evaluates. The empirical method renders possible final conclusions but does not in itself propound theories. Logic is the process of drawing inferences from the phenomena scientifically observed. The methods of logic are the same for all of the sciences. And since the ultimate aim of the scientist is to establish conclusions and from these to deduce scientific laws, the principles of logic become indispensable in the evaluation of causal relationships.

Theories of Causality.—In a vast simplification of the metaphysical concepts of Aristotelianism (q.v.) or the classic theories of David Hume and John Stuart Mill (qq.v.) regarding causal origins, modern scientific method allows for but two basic interpretations of causality:

The Common Sense or Activity View of Causality.—The causal relationships here formulated follow very closely the dictates of common sense which say "every event in Nature has a natural, definable cause." This concept divides naturally into two parts, namely:

(1) If a thing has not changed for a finite length of time, it does not suddenly begin to change, unless some extraneous force or action causes it to change; in short, every change is necessitated.

This principle is admirably brought out by Sir Isaac Newton's First Law of Motion, which states: "A body in motion tends to remain in motion in a straight line with uniform velocity unless acted upon by some exterior force; a body at rest tends to remain at rest unless acted upon by some external force."

The sudden explosion of formerly quiescent chemicals is another example of this principle, since some factor such as varying temperature or pressure must have necessitated the sudden change and produced it accordingly.

(2) The common sense view of causality also subscribes to the proposition: "An identical cause produces an identical effect." In other words, given the effect of a certain cause, and repeating the experiment under exactly the same conditions, the same effect must result.

The Regularity or Uniformity View of Causality.—This viewpoint may be summarized in the two statements:

(1) There are causal laws. These laws, if exact, may be reduced to a symbolic or mathematical representation.

(2) Every event that occurs in Nature is connected with other events, occurring either prior to or simultaneously with the first, by one or more causal laws. If enough of these laws are known, the occurrence of the event may be predicted with absolute certainty.

The uniformity view thus also identifies causation with regularity.

A representative example of a causal relation easily translatable into equation form is that found in the law of falling bodies, $s = \frac{1}{2}gt^2$, which is used to predict the position of any body falling from rest under the influence of gravity alone. Under such circumstances, when the body is free from any initial propulsion, it falls with systematic regularity under uniform acceleration, and hence its position at any time t is predictable with absolute certainty. Corrections may be added to account for retardation of the body due to air resistance.

Kepler's Third Law of Planetary Motions is another excellent example of a causal relationship expressible in simple mathematical terms, namely: $P_1^2/P_2^2 \propto Ca_1^3/a_2^3$ or, in words, the squares of the periods of revolution of the planets about the sun are proportional to the cubes of the mean distances of the planets from the sun. Gravitation is again the causal factor. C is a gravitational constant which insures uniform units throughout the equation. This is the so-called "harmonic law" expressing close regularity in the solar system (q.v.).

Scientific Law and Predictability.—A scientific law is only a law when it is capable of predicting a given phenomenon with certainty and is applicable to 100 per cent of the cases involved. The almost universally designated Bode's Law (q.v.) which in astronomy expresses the distances of the planets from the sun according to a simple arithmetic and geometric progression of numbers is actually not a true scientific law. It might better be called a rule, implying only the usual course of action for the majority of cases, since it breaks down completely for the outer planets Neptune and Pluto, and does not provide a consistent geometrical series in the case of Mercury. Similarly, Sir Isaac Newton's universal law of gravitation, although remarkably without major

proven exception, finds occasional needed reinforcement from the concepts of relativity (q.v.). Gravitational theory alone fails to explain the observed motion in the perihelion of the planet Mercury, while the General Theory of Relativity accounts precisely for the residual error. Without being regarded as a replacement for the law of gravitation, Einstein's relativistic theory may be thought of as a higher approximation of accuracy thereto—or in the light of Einstein's attempts, the two theories may eventually be encompassed in a new and generalized law involving all forms of energy. Another important example of incompleteness in a scientific law exists in the dual nature of light as particle and wave (see LIGHT—*Nature of Light*). Scientific law is always subject to emendation as further facts are discovered or exceptions are found to exist.

In this requirement for absolute predictability, scientific laws may perhaps find their greatest looseness in the fields of social science. Wherever the human element is involved, a vast concomitance of individual uncertainty arises. Economic, sociological, and population-sampling laws, while entirely adequate to predict trends and indicate the expected, normal, or majority action with fair assurance, are not absolutely infallible. Even the economic law of supply and demand, while inevitable in its consequences, can be altered by unpredictable events. Inductive reasoning (see *infra*) is barred from the study of economics; the methods of deduction alone are compatible.

The pattern of mores, social codes, and ethical practices which govern human behavior can likewise be influenced by unusual circumstances. In the field of biological science, the human body is known to contain 24 chromosomes with an almost infinite possibility of genetic combinations thereof, giving rise to an incalculable number of divergent personalities. This protean complexity of the human genetic structure results in the multiplicity of traits, characteristics, qualities, attributes, idiosyncrasies and proclivities which make up the individual. Faced by this range of variables in the human behavior pattern, plus environmental circumstances, scientific method is often hard put to follow a truly representative line of investigation. But singularly enough, scientific method is especially strong in the biological sciences where unrelated variables occur in great number.

In dealing with many phases of socio-economic investigations, as in numerous instances of complex physical processes, it becomes necessary to segregate from among the vast welter of possible factors for study those items which will be of value in the establishment of meaningful conclusions. The principles of scientific method underlying the organization of facts out of apparently chaotic masses of evidence are outlined below.

DISCIPLINES OF SCIENTIFIC METHOD

Observation.—The scientific procedure of comprehending things and events, quantities, qualities, and relationships. Observation may be purely visual in nature, or achieved with the aid of suitable research instruments.

Refractory or Uncontrolled Investigation.—The observation of phenomena under conditions beyond the control of the observer. The observation of the solar corona at the time of a total solar eclipse is an example of uncontrolled investigation, since the astronomer must sometimes travel many thousands of miles to set up his apparatus in the limited geographical region of the eclipse and likewise has no control over the fleeting instants of totality. (See ECLIPSE.)

Experimental or Controlled Investigation.—In this category, the observer must be able to control all aspects of the investigation and exercise command over the variable factors concerned. He must be able to determine the time and place of the experiment. In direct contrast with the preceding example, the use of the *coronagraph* at the Harvard College Observatory-University of Colorado high-altitude station at Climax, Colorado, and similar equipment at other mountaintop observatories throughout the world provide an excellent illustration. Over extended periods of observation which are limited only by the seasonal occurrence of clouds and weather at this high altitude (11,500 feet), the sun's features may be studied instrumentally and by means of permanent equipment at any instant the sun is above the horizon and the sky is clear. By the cooperation of similar research stations around the world, and in both hemispheres, the sun may be placed under observation almost continuously 24 hours a day.

The experimental method makes possible a more reliable analysis, in that the observer may repeat the experiment over and over again at will and thus greatly lessen the probable error of his determinations. Similarly, the investigation may be more or less easily divided into parts, thus facilitating the research and making possible more accurate inference as to the connection between various phases of the experiment. The controlled investigation may be carried out under a variety of conditions and circumstances, each of which may be important to a true understanding of the problem.

Analysis and Synthesis.—These are correlative concepts, one being always the complement of the other. Analysis is an investigative approach to a problem by the resolution or separation of the whole into its constituent parts; synthesis is the process of building up a theory, or a coordinated system, by the combination of individually related facts. Figuratively, if the quantities *a, b, c, d,* are the analysis of *s,* then *s* is the synthesis of the quantities *a, b, c, d.* The two procedures bear a close relationship to the reasoning processes of induction and deduction, respectively. Two distinct types of analysis exist, which are equally applicable to the process of synthesis:

Partitive or Quantitative Analysis.—The physical division of a spatial whole. This method consists in the exhibition of a given entity as a union of material parts. A watch is analyzed partitively when it is divided into its physical components, such as mainspring, dial, and gear wheels. The chemist pursues quantitative analysis when, by the method of electrolysis, he physically separates proportionate quantities of the components of which water is made, namely two parts of hydrogen and one part of oxygen. Here the observer is concerned with the *amount* and not the *kind* of the chemical components. So long as he interests himself solely with the quantitative division of a given compound or substance into its constituent elements or stable radicals, he employs the partitive method. Should he investigate the chemical properties of the substance, however, he bridges the gap to the method of qualitative analysis. Because of their close in-

terrelationship in chemistry, the two actions are often concomitant. Quantitative analysis may be subdivided into two further classifications or criteria:

(1) Homogeneous—The analysis is homogeneous if the components are identical in nature with the substance analyzed. This is precisely a physical partition. The components need not be of the same size or shape, however, and one fact alone is important in the definition: Although the size, shape, physical properties and surfaces of the original substance may be destroyed, the intrinsic properties of the original substance are preserved and remain in the secondary portions no matter to what degree the partition is carried out. The division of a cube of sugar into smaller parts or the physical division of a gallon of water into quarts and pints are typical examples.

(2) Heterogeneous—The analysis is heterogeneous when the individual components do not belong to, or possess the same intrinsic properties as the whole. The division of a watch into mainspring, dial, and other component parts, or the physical decomposition of water into proportional quantities of hydrogen and oxygen by electrolysis are previously quoted examples of this type.

Qualitative Analysis.—The determination of the basic and functional properties of any substance or object. If, instead of listing the parts of a watch, one were to describe the characteristic appearance, composition, and qualities of the watch—that it is circular, made of metal, records the time, and so on, he has entered the field of qualitative analysis. The decomposition of sugar into its chemical elements carbon, hydrogen, and oxygen by the addition of sulphuric acid belongs to the method of qualitative analysis, which includes many chemical investigations. Qualitative analysis is the descriptive as opposed to the mensural.

Supposition and Hypothesis.—Active interrogation to discover the cause of a given event in Nature often makes resort to a preliminary supposition or hypothesis, which is proposed as an unverified conjecture in an effort to explain the basis of the unknown phenomenon, subject to ensuing proof. The working hypothesis is initially assumed to be true, as a point from which to start, but remains barren until it is successful in explaining all the facts. Without such preliminary hypotheses, all research investigations would be aimless. Therefore, any hypothesis whatsoever until put to the test is better than none. If it stands the tests, it becomes "fruitful" and no longer may be spoken of as barren. Hypotheses require great imagination and considerable familiarity with the subject concerned. In practice, there are two laws which govern the development and expression of the hypothesis:

(1) The hypothesis must contain nothing inconsistent with known facts and principles.

(2) The hypothesis must not contain postulates which are not subject to verification by empirical test.

One of the best examples of a truly fruitful hypothesis is that of the discovery of Neptune after the hypothesis had been ventured that the observed discrepancies between the calculated and observed orbits of the planet Uranus might be due to the gravitational attraction of another planet still farther out in space than Uranus. In the year 1846 this outer planet, Neptune, was actually discovered, thus completely verifying the hypothesis originally proposed. (See NEPTUNE.)

Analogy and Comparison.—Analogy is the utilization of any respect in which two or more objects agree in order to explain an unknown object or its action by reference to that whose properties are known. Scientifically, the process of analogy may be extended to the determination of the possible cause of an unknown phenomenon by its similarity to one or more other occurrences whose cause is known. The role of analogy is therefore frequently important in the formulation of a working hypothesis. True analogy is discoverable, however, only by a careful comparison of all elements involved rather than a cursory examination of a few random or isolated cases of agreement. The procedure is subject to many pitfalls where extrinsic rather than intrinsic variables are selected for comparison. As an example, the inverse square laws expressing the variation of attracting force with distance in the case of (1) magnetism and (2) gravitation are almost exactly similar. But to reason by pure analogy that the two forces are identical in nature is fallacious. This concept was once regarded as true.

Inference.—Inference is the process of deriving propositions on the evidence of other propositions whose truth is known to be established. Inference may be of two types:

Deductive.—Deductive inference is reasoning from general premises to specific derived instances thereof. The procedure involved may be summarized in the simple hypothesis "if proposition p is true, then proposition q is likewise true." As an example, "If it rains, the streets are wet." (If p, then q.) The method of deduction proceeds in the following fashion: (1) The general principle or premise, which must be true, is stated; (2) A special case is adduced as an instance of the general principle (and hence must fall under the coverage of this principle); (3) The inference, conclusion, proof, or demonstration results therefrom.

Inductive.—Inductive inference is concerned with the derivation of general propositions from the evidence of specific cases which come under the induced generalization. As reasoning from specific to general, inductive inference is exactly opposite to deductive inference.

The formal statement of the method is as follows: (1) Many particular instances with common characteristics point to the formulation of certain conclusions, in the form of general laws or principles; (2) These characteristics must be common to all instances and, theoretically, an infinite number of cases must be taken as examples and proof; (3) Accordingly, in most cases under this method of investigation, the conclusion drawn is only a probability, whose accuracy increases as the number of cases represented increases.

Idealization and Abstraction.—Since the human capacity for understanding is duly limited by the complexity of a problem which confronts it, the intricacies of many difficult problems make it necessary to simplify the aspects these present. In that process, certain of the investigation's phases must be disregarded, and the method resorted to takes the form of abstraction.

The so-called "economic man" is an abstraction. Herein, man's purely economic motives are involved, all others being forgotten. The economic man always buys the cheaper of two commodities of the same quality offered for sale; he always buys the best one of two objects at the

same price. In abstracting man's complex personal motives, the method obviously becomes one of idealization. Frictionless motion which is sometimes assumed in mechanics and physics likewise involves the principle of idealization and abstraction. In order to derive practical laws of motion, the fact is ignored that all bodies on the earth actually move in a surrounding medium, air. Where celestial bodies revolve freely in outer space, unimpaired by frictional retardation, an idealization is, in fact, the existing rule. The "frictionless" motion of Timken bearings is an idealization, for it is impossible completely to eliminate the retarding effect of friction on a rotating body.

Classification.—Classification is the activity of organizing objects unified by a common attribute or property into certain useful groupings. The process of classification is an artifice often resorted to in order to simplify the approach to a given problem by narrowing its broader elements and ramifications on the basis of categorical distinctions. The method is especially valuable in the field of biological sciences.

Proper care must be exercised in the evaluation of these distinctions. Errors in classification resulting from the consideration of superficial rather than fundamental distinctions are of widespread popular occurrence. Thus the frequent classification of whales as fish under the theory that they bear a superficial resemblance—namely that each swims in the ocean—is erroneous. Herein fundamental differences are ignored and camouflaged by environmental similarity. The whale is a mammal. Coal is often loosely defined as a mineral rather than by its true description as a fossilized carbonaceous material of vegetal origin, because of its superficial resemblance to known minerals—again the subordination of fundamental issues before more obvious ones. The sea-anemone (q.v.) and sea-cucumber (see HOLOTHURIA) were once regarded as plants, totally ignoring their basic distinction as marine animals. Breathing, combustion, and erosion are all processes of oxidation and yet cannot with proper evaluation be brought under the same classification. It is apparent that whatever quality is used as a basis for classification must form a distinct and fundamental criterion in the objects being classified.

Such are the basic evaluative processes and techniques of scientific method, the application of which has led to new discoveries in many fields of knowledge. The same investigative principles are also effectively used in criminology, law, and numerous related aspects of argumentative discourse, polemics, and debate. See also ARGUMENTATION; CAUSE; CLASSIFICATION; DEDUCTION; DETERMINISM; HYPOTHESIS; INDUCTION; KNOWLEDGE; LOGIC.

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SCILLA, sĭl'ä, town and commune, Italy, in the Province of Rizzio di Calabria, on the Strait of Messina. It is the center of a large citrus fruit and olive region. In 1783 and again in 1908 it was severely damaged by earthquakes. Opposite Scilla, near Punta del Faro, is the Garofalo whirlpool, the supposed Charybdis of ancient legend (see SCYLLA AND CHARYBDIS). Pop. (1946) of commune 4,608.

SCILLA, headland. See SCYLLA AND CHARYBDIS.

SCILLA, a genus of bulbous-rooted plants of the lily family (Liliaceae) with linear radical leaves, spreading perianth, and a leafless scape of blue, rose, or purple flowers. Cultivated species are the Siberian squill (*S. sibirica*), the Cuban lily (*S. peruviana*); the English bluebell or wood hyacinth (*S. nonscripta*).

SCILLY ISLAND, atoll, South Pacific Ocean, one of the most westerly of the Society Islands and uninhabited. It is also called Fenura Ura.

SCILLY ISLES or **ISLANDS,** sĭl'i, an archipelago, 6.3 square miles in area in the Atlantic Ocean, 28 miles from Cornwall, of which it is a part. The derivation of the name Scilly is obscure. There are some 140 islets and rocks with an area of 4,041 acres in the group; five of them, St. Mary's (the largest), Tresco, Saint Martin's, Saint Agnes, and Bryher, are inhabited. The estimated population (1954) was 1,864 (1951 census, 1,740).

Generally identified with the Cassiterides (tin islands) of the Phoenicians, the Scilly Isles are composed of granite, most of which is coarse and porphyritic, and contain a few metalliferrous veins, but little tin. The Atlantic has hollowed out caves in the cliffs, and reefs and shoals make navigation perilous in rough weather. Bishop Rock lighthouse, built in 1858 and rebuilt 30 years later, is situated on an outlying rock to the southwest, and there are lighthouses on Round Island and at Peninnis Head (Saint Mary's). The climate of the group is mild and equable, giving rise to an early flower- and vegetable-growing industry for the London market; there is also a small fishing industry. The chief town, Hugh Town, on Saint Mary's is connected with Penzance by a steamer service, and with Saint Just by air. Radio telephone and telegraph communication is maintained with the mainland. Hugh Town is also a tourist resort, and Star Castle, built in 1593, at which Prince Charles stopped in 1645 on his flight to Jersey, is now a hotel. On Tresco are King Charles' and Oliver Cromwell's castles, the ruins of a 10th century abbey, and the residence, with its famous tropical gardens, of Augustus Smith, proprietor of the islands from 1834 to 1872. Bronze Age burial mounds and prehistoric remains are found on a number of the islands, and Samson is the scene of Besant's *Armorel of Lyonesse;* Annet is a bird-breeding ground. From the time of Athelstan's gift of the islands to a group of monks in 936, the islands remained in private hands until they were handed over to the Crown in 1933.

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SCINTILLATION, sĭn-tĭ-lā′shŭn, *in astronomy,* the apparent twinkling of the stars as their light rays pass through the Earth's atmosphere and are affected by (1) random variations in optical density produced by winds, air currents, and atmospheric turbulence; (2) optical interference (q.v.) of light rays.

Since the stars are too far away to show as disks to the unaided eye or even to the most powerful telescope, they act as point sources of light. On entering the Earth's atmosphere, the component rays of color are refracted in different amounts, but reach the Earth's surface over paths differing only slightly. In-phase and out-of-phase overlapping between closely adjacent light waves causes reinforcement of some colors and elimination of others. As a result, the stars seem to fluctuate in both intensity and color.

By contrast, all of the planets visible to the unaided eye are close enough to the Earth to reveal perceptible disks as seen in large telescopes. Their rays thus act more nearly as beams than as thin pencils of light. As these planetary rays enter the Earth's atmosphere, they traverse a greater multiplicity of paths, avoiding much of the mutual interference which affects light from a star. A general blending and averaging out of interference effects occurs in planetary images to produce light sources of more or less constant intensity. In consequence, the planets, except when near the horizon, usually shine with a steadier light than the stars.

Scintillation varies with the optical depth and density of the atmosphere; hence even the stars twinkle less when seen from a high mountain or when directly overhead in the zenith. When viewed on or near the horizon, through a longer atmospheric light path and a layer of air in which the density and turbulence are greater, they tend to sparkle and, especially when seen through a telescope, may dance and waver noticeably under the effects of strong air currents.

In physics, scintillation is the name given to the action of certain fluorescent substances, notably impure zinc sulphide, in giving off flashes of light when exposed to radioactive emission (see RADIOACTIVITY). Although such flashes may persist for only about one millionth of a second, they form the basis of many types of scintillation counters and radioactivity detectors.

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SCINTILLATION COUNTER, a device for detecting the presence of radioactive energy by the use of a large crystal of zinc sulphide, sodium iodide, or other radiation-sensitive material (phosphor), which when struck by radioactive particles, gives off minute flashes of light. Such crystals are artificially grown, and have had purposely introduced into them very small amounts of impurities such as one ten-thousandth part of a copper salt or a trace of thallium.

The impact of radioactive particles is transformed by the crystal into tiny bursts of light, which are amplified by a photomultiplier tube. Use of a series of electron-emitting surfaces in this tube permits billionfold amplification of each light flash into an electrical impulse capable of registration by a buzzer, blinking light, or meter. Radioactive alpha and beta particles (see RADIOACTIVITY) may be measured by this means, at a rate up to a million a second, where inorganic phosphors are used.

Liquid scintillators are also available, as well as organic phosphors capable of response to impulses of a few billionths of a second duration, but giving less accurate energy measurements than those derived from the use of inorganic crystals. In a gamma-ray type of scintillation counter, a crystal of trans-stilbene is employed. Giant laboratory scintillation counters are used to investigate atomic structure, especially the nature of the neutrino, and to detect pi-mesons. The scintillation counter is also used in uranium prospecting, the detection of radiation hazards, and in biological and medical tracer research.

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SCIO, the Italian name for the island of Chios (q.v.).

SCIOPPIUS, sī-ŏp′ĭ-ŭs, **Kaspar** (Latinized form of KASPAR SCHOPPE), German classical scholar: b. Neumark in the Palatinate, May 27, 1576; d. Padua, Italy, Nov. 19, 1649. He received his education at Heidelberg and at Altdorf, and before the age of 21 had published several learned books, the most noted being his *Verisimilium Libri Quatuor,* and *Suspectae Lectiones,* which attracted the attention of Pope Clement VIII. During a visit to Italy in 1598 he renounced Protestantism, and became a protégé of the Vatican. He is said to have written more than 100 books, most of them under an assumed name, satirizing the leaders of the Protestant movement. The first person whom he attacked was the illustrious Joseph Justus Scaliger (1540–1609), against whom he launched his *Scaliger Hypobolimoeus* (1607), in which he also assailed Henry IV. In 1608 he published more than 20 pamphlets against the Protestants, urging the Roman Catholic powers to exterminate them. Among his later books the most notable are *Grammatica Philosophica* (1628), and *Paradoxa Literaria* (1628).

SCIOTO, sī-ō′tō, river, Ohio, rises in Auglaize County, flows east for a few miles, then south to the Ohio River, which it enters near Portsmouth. Other cities on its banks are Columbus, Circleville, and Chillicothe. It is about 237 miles long, is navigable for about 130 miles, and for 90 miles feeds the Ohio and Erie Canal It flows through a fertile valley.

SCIOTO COMPANY, The, in American history, a land-speculating organization formed in the eastern states in 1787 for the purchase of territory along the Ohio and Scioto rivers. John Cleves Symmes, Joel Barlow, and William Duer, of New York, were largely interested. The organizers at first bought lands of the Ohio Company and appointed Barlow their agent in Europe to make sales of them and to induce immigration. Barlow had been in England previously on similar business for the Ohio Company. Symmes parceled out the lands to other parties, the tract which now embraces the city of Cincinnati falling to the share of Matthias Denman, Robert Patterson, and John Tilson, of New Jersey. As a result of Barlow's activities 218 emigrants sailed from Le Havre to settle on those lands, Feb. 19, 1790. About 50 of them settled at Marietta and the remainder formed the Gallipoli's settlement. The emigrants suffered from lack of promised supplies and inability to get clear titles to their lands, and

the company, failing to meet its obligations, was charged with swindling.

SCIPIO AEMILIANUS AFRICANUS MINOR NUMANTINUS, sĭp′ĭ-ō ē-mĭl-ĭ-ā′nŭs ăf-rĭ-kā′nŭs mī′nēr nū-măn-tī′nŭs, **Publius Cornelius** (known as SCIPIO THE YOUNGER), Roman general: b. 185 B.C.; d. Rome, 129 B.C. The second son of Lucius Aemilius Paullus Macedonicus, he was adopted by Publius Cornelius Scipio Africanus, the childless elder son of Publius Cornelius Scipio Africanus Major (Scipio the Elder). Scipio participated in the Battle of Pydna (168), in which his natural father concluded the Third Macedonian War (171–167), and then served as military tribune in Spain (151), where he won distinction. The outbreak of the Third Punic War (149–146) saw Scipio still a subaltern, but his gallant conduct in Africa and his general's commendation gained for him the consulate (147) and command of the Roman forces besieging Carthage. In 146 he captured Carthage, which he razed (amid tears, it is said), selling the survivors into slavery. He organized the Punic domains into the Roman province of Africa and returned to Rome, where he celebrated a triumph. To his inherited agnomen Africanus he added the additional agnomen Minor (the Younger) to distinguish him from his grandfather.

Scipio became censor in 142 and served on legations to Greece and the Near East during either 141–140 or 136–135. Re-elected consul for 134 and assigned Spain as his province, he concluded a war there by capturing Numantia (133) after a long siege, receiving another triumph in Rome and another agnomen Numantinus (132).

Perhaps more important than Scipio's military exploits were his patronage of the littérateurs who constituted the influential Scipionic Circle. His acquaintance with Greek literature and philosophy was above that of his Roman contemporaries, and he had great oratorical attainments. In politics he championed the conservative party against the democratic party, led by his brothers-in-law and first cousins, Tiberius Sempronius and Gaius Sempronius Gracchus (q.v.). Scipio's sudden death after political disorders has been ascribed to assassination, but for this no evidence exists.

Consult Lincke, E. M., *P. Cornelius Scipio Aemilianus* (Dresden 1898); Brown, R. M., *A Study of the Scipionic Circle* (Scottdale, Pa., 1934); Bilz, K., *Die Politik des P. Cornelius Scipio Aemilianus* (Stuttgart 1936).

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SCIPIO AFRICANUS MAJOR, sĭp′ĭ-ō ăf-rĭ-kā′nŭs mā′jĕr, **Publius Cornelius** (known as SCIPIO THE ELDER), Roman general: b. 237 B.C.; d. Liternum, Italy, 183 B.C. Destined to be the most renowned Roman of his generation, the youthful Scipio saved his father's life in the Battle of the Ticinus River (218), which inaugurated the Second Punic War (218–201) in Italy. As military tribune, he rallied the Roman remnant after the disastrous defeat at Cannae (216). After acting as aedile (212), Scipio went as proconsul (210) to Spain, where he soon captured Cartagena (209), the chief Carthaginian base. Then by spirited leadership, by revising Roman military tactics, by attracting Spanish allies to his side, and by brilliant campaigning, he so completely conquered the Carthaginians during 208–206 that Punic control of the peninsula collapsed and the Romans acquired almost all Spain (and afterward Portugal) as provinces. Returning to Rome, Scipio became consul in 205 and received Sicily as his province. There he organized the Roman invasion of Africa, which he began in 204. Scipio was so successful in his sieges of Carthaginian cities and in his battles against Punic armies that the Carthaginians sued for peace, summoning Hannibal, their greatest general, from Italy in 203. Hannibal's return inspired renewal of hostilities, which ended in the Battle of Zama (202), where the Romans under Scipio conquered the Carthaginians commanded by Hannibal. Scipio dictated harsh terms of peace in 201 and returned to Rome, where he celebrated a triumph and received the surname Africanus, to which later Romans added Major to distinguish him from his grandson, whose capture of Carthage in the Third Punic War won him the surname Minor.

Chosen censor (199), named chief of the Senate (199, 190), re-elected consul (194), Scipio tried his hand at making policy, but with less success than he had won in waging war, since his stanch philhellenism found few supporters in the Senate, which prescribed foreign policy. But his military experience was utilized in 190, when he served as legate to his brother Lucius, who conducted the war against King Antiochus III the Great (r. 223–187) of Syria, whose crushing defeat at Magnesia in Asia Minor (189) was due to Publius' plans, though illness prevented the latter's participation in battle.

Scipio's return from Asia was robbed of acclaim by an accusation that he and his brother had accepted bribes from Antiochus. Though the truth has been clouded by conflicting testimony, it is evident that the prosecution (187–185) was engineered by his political enemies. After a dramatic acquittal, Scipio retired to his Campanian villa at Liternum, where he passed his last years in privacy.

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SCIRE FACIAS, sī′rē fā′shĭ-ăs, a judicial writ requiring the party to whom it is directed to show cause why the plaintiff should not receive the relief which he has requested. This proceeding is used most often to revive a judgment but may also be used to have a record, such as a patent, declared invalid or corrected. It may also require a person to show that he has a right to perform an act despite the plaintiff's claim of expected injury. The writ is obtained on the basis of the plaintiff's petition, which must show the material facts justifying the issuance of the writ. The recipient of the order may serve pleadings in defense just as he might to an ordinary complaint; on the return of the order, a hearing or trial will be held to determine whether the plaintiff, in fact, deserves the relief asked. The term is disappearing from legal use, but the benefit of it still exists under the more common name of "an order to show cause."

SCIRPUS, sûr′pŭs, a large genus of rushlike or grasslike plants of the sedge family (Cyperaceae), universally distributed and commonly known as bulrushes or club rushes. Many species are partially or completely of aquatic habit. They are annual or perennial, some small and some

large. The small, perfect flowers have usually a perianth of bristles, and are in spikelets, with or without subtending involucres, and mature into variously shaped achenes. The spikelets are either solitary or in groups, and are very commonly umbelled. These plants are often called rushes or bulrushes, and are common in wet woods or swamps, and often rise conspicuously out of shallow water. *Scirpus cyperinus,* the brown wool-grass, has immense drooping umbels of spikelets, supported on slender cylindrical stems. It is perennial, two to six feet high, with curving grass-like leaves, and is a familiar plant at the edges of forest ponds, growing in colonies. *S. cernuus,* one of the few species cultivated, is a good pot-plant, having long drooping stems, forming a dense mat at the base, and with solitary spikelets. *S. lacustris,* the great bulrush of the Old World, is known as the mat-rush, because it was employed for weaving into mats, chair-bottoms and cordage. It is a curious aquatic plant whose very smooth, blue-green, tall stems bear at the top flexuous umbels of spikelets. This species and the allied *S. tatora,* are the «tulés» (q.v.) of the American Southwest.

SCIRRHUS, or **HARD CANCER,** a scirrhous cancer. See CANCER.

SCISSOR-BILL, a bird. See SKIMMER.

SCISSOR-TAIL, a beautiful flycatcher (*Milvulus forficatus*) of the lower Mississippi Valley, which receives its name from its habit of crossing and recrossing in flight the two very long outer feathers of its tail. It is white with dark wings and a roseate flush upon its breast and on the lining of its wings, and is exceedingly graceful. Its general habits are those of the flycatchers (q.v.).

SCISSORS. See CUTLERY; HARDWARE INDUSTRY IN AMERICA.

SCLEROMETER, scle-rom'e-ter, an instrument for the accurate determination of the hardness of minerals. In one form the mineral is mounted on a small carriage moving along a track. Upon this is a lever with weighted diamond point which is in contact with the surface to be tested. Weights are then added to a pulley connected with the carriage until they are just sufficient to move the carriage and produce a scratch on the mineral. In the microsclerometer of Jagger hardness is ascertained with any one of four variables: rate, weight, depth or duration (see *Amer. Jour. Sci.,* IV, 399, 1897). The sclerometer shows that different faces of crystals vary in hardness. By rotating a crystal through 180 degrees and recording the weight required to produce a scratch for each 10 degrees, it is possible to secure data from which the "curve of hardness" can be constructed. Jagger has determined the absolute hardness of some of the minerals in the Mohs scale, assuming a value of 1,000 for corundum, as follows: topaz 152, quartz 40, orthoclase 25, apatite 1.23, fluorite .75, calcite .26, gypsum .04.

SCLEROTIC, SCLEROTICA, or **SCLEROTIC COAT.** See EYE.

SCOLECIDA, skō-lĕs'ĭ-dą, a group of worms and worm-like animals, mostly internal parasites, term now used only in a general way, as its members have been more scientifically distributed in classification in the phyla *Platyhelminthes, Nematohelminthes,* etc.

SCOLECITE, skŏl'ę-sīt, a mineral belonging to the natrolite group of the zeolite family. It is a hydrous silicate of aluminum and calcium, $CaAl_2Si_3O_{10} + 3H_2O$. When heated before the blowpipe it swells and sometimes curls up like a worm, to which property it owes its name, from the Greek *skolex,* a worm. It then fuses easily to a white, blebby enamel, thus distinguishing it from natrolite, which fuses with equal ease and without intumescence to a colorless glass. Its crystal habit is slender-prismatic and much resembles natrolite. Its crystals are, however, horizontally striated on the prisms and are monoclinic twins, the twinning being revealed by feather-like diverging striations on the clinopinacoid, while natrolite crystals are orthorhombic and show vertical striations in the prismatic zone. Its snow-white or transparent, vitreous crystals are usually clustered in diverging groups. It is also found massive or in radiated nodules. It is a secondary mineral usually in trap or amygdaloid. Among the best known of its many localities are Poona, British India, and Berufiord in Iceland; it has been found sparingly in the United States in the Palisades of the Hudson and at Golden, Colo.

SCOLLARD, Clinton, American novelist: b. Clinton, N. Y., 18 Sept. 1860; d. 19 Nov. 1932. He was graduated from Hamilton College in his native place and was a professor of rhetoric and English literature there 1888–96 and 1911–12. He also studied at Harvard and Cambridge, Eng. He traveled extensively, and from the last-name date devoted his entire attention to literary pursuits. His early work was mainly verse of a light and musical character evincing great command of metres, but with no very salient characteristics. His later verse showed a marked increase of strength as well as melody, while the earlier facility later became an almost faultless technique. The lyric was his especial field, although he now and then attempted epic forms. In his later years he produced several noteworthy historical romances. Among his books of verse may be cited 'Pictures in Song' (1884); 'With Reed and Lyre' (1886); 'Old and New World Lyrics' (1888); 'Songs of Sunrise Lands' (1892); 'Lyrics of the Dawn' (1900); 'The Lutes of Morn' (1901). His most important novels are 'A Man at Arms' (1898); 'The Son of a Tory' (1900); 'The Cloistering of Ursula' (1902); 'Lyrics of the Dawn' (1902); 'Count Falcon of the Eyrie' (1903); 'Footfaring' (1904); 'The Lyric Bough' (1904); 'Ballads of Valor and Victory,' with Wallace Rice (1904); 'Lyrics and Legends of Christmas-tide' (1904); 'Odes and Elegies' (1905); 'A Southern Flight,' with F. Dempster Sherman (1906); 'Easter Song' (1907); 'Voices and Visions' (1908); 'Pro Patria' (1909); 'Chords of the Zither' (1910); 'The Vicar of the Marches' (1910); 'Songs of a Syrian Lover' (1911); 'From the Lips of the Sea' (1911); 'Lyrics from a Library' (1913); 'Poems — Selected' (1914); 'The Vale of Shadows and Other Verses of the Great War' (1915); 'Italy in Arms and Other Verses' (1915); 'Ballads Patriotic and Romantic' (1916); 'Let the Flag Wave and Other Verses'

(1917); *Epic of Golf* (1923); *Songs of Summer* (1927); *Lyrics of Life* (1928); *Lyrics of Florida* (1929); *The Crowning Years* (1929); *Songs out of Egypt* (1930).

SCOLOPACIDAE, skŏl-ō-păs'ĭ-dē, a cosmopolitan family of wading birds, comprising the snipes, sandpipers, curlews and allied genera. The bill is long, very slender and flexible. They frequent bogs and marshes or the banks of rivers and ditches, where they probe the ground for worms, insects and testaceous mollusks. In the most modern classification these groups are combined with the plovers, under the broader name *Charadriidae,* of which all but the plover (*Charadriinae*) constitute the subfamily Scolopacinae. Consult Evans, *Birds* (New York 1900).

SCOLYTIDAE. See BARK-BEETLES.

SCOMBRIDAE, skŏm'brĭ-dē, a family of percomorphous fishes, comprehending the mackerel (q.v.) and its allies. The body has an elongated fusiform shape, oval in cross-section, with a conical pointed head and deeply forked caudal fin with falcate lobes. The scales are minute and anteriorly form a peculiar area known as the corselet, and the prominent lateral line takes a wavy course for its entire length. The mouth is large and armed with strong, sharp teeth, the eye large and the gill-slits extensive and free. Of the fins the pectorals and ventrals are small, the former situated high on the sides and the latter on the belly nearly or quite beneath them; the spinous dorsal is far forward and supported by slender spines; the second dorsal and anal are of similar shape and usually situated near the level of the vent, and each is continued to the base of the tail by a series of small detached finlets. The caudal peduncle is slender and bears lateral keels. The colors are generally metallic steel blue above, marked with bands, streaks or spots of black or yellow and silvery white or golden below. Internally the pyloric caeca are numerous and the swim bladder may be present or absent. The flesh is oily and a streak of deep red muscle extends along either side and is sharply distinguished from the remaining pale muscles. All of the mackerels are extremely active, predaceous, pelagic fishes, which roam far and wide over the sea in large schools and often approach the coasts to spawn. They are especially well adapted by the form of the body for rapid swimming, and resistance to the water is much lessened by the completeness with which all fins and other prominences can be depressed into recesses, so that they become exactly flush with the surface. The number of genera and species is not great, about 12 of the former and 60 of the latter being recognized, but most of them are widely distributed and have occurred or are likely to occur in our waters. Besides the mackerel, some of the most important are the Spanish mackerel, bonitoes and tunnies or horse mackerel. Consult Jordan and Evermann, *American Game and Food Fishes* (New York 1902).

SCONE, skoon, Scotland, a village in Perthshire, on the north bank of the Tay, a little above Perth, famous as having been the seat of one of the most noted Scotch abbeys. Scone is first mentioned in the beginning of the 10th century and in its abbey, built probably about the same period, was located the famous stone, according to tradition "Jacob's Pillow," on which the kings of Scotland were crowned, and which was carried by Edward I of England to Westminster Abbey where it rests under the coronation chair.

SCOPAS, skō'pas, Greek sculptor: b. Paros, and flourished between 395–350 B.C. He was the son of Aristandros, a sculptor in bronze, and went to Athens about 377 B.C., where he lived about 25 years. He belonged to the Later Attic School of which Praxiteles was another distinguished member. For the temple of Athena Alea at Tegea he made the sculptures of both pediments and the statues of *Asklepios* and *Hygieia* for the interior. In various parts of the Peloponnesus he executed statuary, as for instance, the *Asklepios* at Gortys, in Arcadia, a *Herakles* at Sicyon; an *Athena Pronaos* and an *Artemis Eucleia* at Thebes; also a group *Eros, Himeros and Pothos* (Love, Longing and Desire) at Megara. One of his most famous statues was the *Bacchante* ornamenting the theater of Dionysus at Athens; another was the *Niobe* of which the copy of the lost original is in the museum at Florence.

SCOPES CASE. In March 1925 the legislature of Tennessee passed a law forbidding the teaching in the public schools of the state of "any theory which denies the story of the Divine creation of man as taught in the Bible," and the teaching "instead that man is descended from a lower form of animals." John T. Scopes, a teacher of biology in the high school of Dayton, was indicted on the charge of transgressing this law, and was brought to trial on July 10. The prosecution was conducted by the attorney-general of the state, assisted by W. J. Bryan. Scopes was defended by Clarence W. Darrow, Dudley F. Malone and Arthur G. Hayes. After a spectacular trial ending July 21, Scopes was found guilty and fined $100. Five days later Mr. Bryan suddenly died, a grim aftermath to a trial that had roused nationwide ridicule. In 1927 the state appellate court reviewed the case and reversed the verdict, preventing an appeal to the United States Supreme Court.

SCOPOLAMINE, skō-pŏl'ą-mēn, Hyoscine, an alkaloid obtained from a number of Solanaceous plants, especially *Datura Metel.* It was discovered in 1888 by Schmidt in *Scopolia atropoides.* It is usually obtained as a liquid, but can be crystallized from ether, melting point 59°C., slightly soluble in water, levorotatory. It has the formula $C_{17}H_{21}NO_4$, and is chemically *l*-tropylscopine, an ester of *levo*-tropic acid with the amino alcohol scopine. Scopolamine forms many crystalline salts, the hydrobromide ($C_{17}H_{21}NO_4 \cdot HBr + 3H_2O$) being most common in medicine.

SCORE, *in music* the original transcript of a musical composition, with the parts for all the different voices or instruments arranged and placed in juxtaposition; so called from the practice of drawing the bar through all the parts. As a general rule the highest part should be placed uppermost, the others under it and each other, according to the lowness of the part.

All the parts of a chorus should be placed together: the soprano standing on the upper staff, the mezzo or second soprano (if any) on the one immediately below it, and so descending in the following order—contralto, second contralto (if any), tenor, second tenor (if any), bass and, lowest of all, second bass (if any). A good musician is able to form a pretty close idea of the effects the composer intends to produce by carefully reading the score. See MUSIC.

SCOREL, Jan van. See SCHOORLE, JAN VAN.

SCORESBY, skōrz'bĭ, **William,** English Arctic explorer: b. Cropton, near Whitby, Yorkshire, Oct. 5, 1789; d. Torquay, Devonshire, March 21, 1857. He was the son of a whalefisher of the same name and made his first voyage with his father in the *Dundee* when but 10, and for eight years after 1803 they made annual voyages, young Scoresby studying at the University of Edinburgh between voyages. In May 1806 in the *Resolution* they reached the highest northern latitude (81° 30′) then attained. The elder Scoresby resigned his command of this ship in 1811 and was succeeded by his son, who continued the northern whaling expeditions and at the same time made observations of the electrical phenomena of the Arctic regions and it was through his reports that the government was induced to send out the Arctic expedition under Sir John Ross in 1817. In 1823 after 17 voyages to the Greenland and Spitsbergen regions he quit whalefishing, and several years later became a divinity student at Queens College, Cambridge. He was graduated in 1825, ordained in that year and subsequently held various livings and became well known for his philanthropic labors. He visited the United States in 1842 and in 1848, and made a voyage around the world in 1855–1856 in the pursuit of magnetic researches. He published *History and Description of the Arctic Regions* (2 vols., 1820); *Journal of a Voyage to the Northern Whale Fishery, Including Researches and Discoveries on the Eastern Coast of Greenland* (1823); *Discourses to Seamen* (1831); *Magnetical Investigations* (1839–1852); *Zoistic Magnetism* (1850); *The Franklin Expedition* (1850); *My Father: Being Records of the Adventurous Life of the Late William Scoresby, Esq.* (1851).

SCORODITE, a mineral occurring in small leek-green to reddish-brown quartzoid crystals of orthorhombic form associated with the arsenical minerals of Europe, Siberia, Brazil, Utah and many other localities. It is also found as a pale green incrustation around hot springs, occurring thus in Nevada and the Yellowstone Park.

SCORPIO, *in astrology* the "accursed constellation," the "false sign," ominous of war, discord and woe. It is of "watery triplicity," and is attended at its setting by tempests and by autumnal diseases.

In astronomy the eighth sign of the Zodiac, its symbol is ♏. The main star of this constellation is Antares, a red star of the first magnitude, which has a green companion of the seventh.

SCORPION FLY, a neuropterous insect of the family Panorpidae, in which the head is prolonged to form a beak. The body is long and slender. The legs are long, the tarsi being five-jointed; and two spur-like processes exist in the tibiae or shins. They have four, multiveined wings. The name scorpion fly is derived from the appendages attached to the abdomens of some species. In certain species the sixth and seventh joints of the abdomen are attenuated and capable of extensive motion; while the last joint forms a pair of forceps resembling those of the earwigs. When at rest this tail is curled over the back, but when irritated the forceps are used as weapons of offense or defense. These insects are found chiefly in damp situations, under bushes, etc.

SCORPIONS, predaceous arthropods of the order Scorpiones (or Scorpionida), the most primitive land arachnids, and the oldest, being known from Silurian fossils, are reputed to have been the first land animals. These flattened, distinctly segmented creatures are characterized by the presence of a poisonous sting on the end of the abdomen, the five terminal segments of which are sharply narrowed to form a long, ringed, moveable postabdomen or "tail." In life the tail is curled over the back so that the curved, spine-like sting is in position to strike insects, spiders, and other small living animals that serve as food. The cephalothorax, which presents above a flat carapace bearing a pair of large median eyes and a group of two to five small eyes on each side margin, is broadly joined to the abdomen as in solpugids and pseudoscorpions, not narrowed to a slender waist as in such distant relatives as whip scorpions and spiders. The four pairs of walking legs are similar and relatively slender. Held out in front to test the terrain is a pair of long, robust pedipalpi provided with stout pincers similar to those of lobsters, which are used to hold the prey. A small but strong pair of chelicerae in front of the mouth aid in crushing the body of the victim, preparatory to predigesting and pumping the liquid through the simple mouth into the digestive tract. As in all arachnids, the genital products are voided through a pore which opens on the ventral face of the second abdominal segment in both sexes. Immediately behind are a pair of pectines, comblike organs found only in scorpions and thought to have a sensory function.

Scorpions are solitary, nocturnal creatures that attack each other as readily as any other suitable prey. The male performs a sort of courtship by grasping the hands of the female and rubbing his tail against hers, after which copulation occurs. The male is often attacked and killed by the female. Whereas most arachnids lay eggs, the scorpions are viviparous, bringing forth living young. The newly born scorpions mount the back of the mother and stay there until after their first molt, usually for about a week. During this period they consume the food stored in their bodies. The ridiculous belief that these weak, tiny babies feed upon the body of the mother has no basis in fact. No less a fable is the classic story that scorpions commit suicide by stinging themselves when they are helplessly cornered or surrounded by a ring of fire. During frantic efforts to escape the ring, the victim stings at random, sometimes striking its own body before succumbing to the heat of the flames.

The venom of most scorpions causes mild to severe local reactions at the site of the sting. A

few species of relatively small size and belonging mostly to the family Buthidae are known to cause pronounced neurotoxic reactions in man and warm-blooded animals. Most notorious of all is the Durango scorpion, *Centruroides suffusus,* which has caused many deaths among children in the Mexican city of Durango. Paving of the streets, improvements in sanitation and the wearing of shoes have sharply reduced the danger from this species, which abounds in the area and often enters houses. Two allied species occur in Arizona where they have gained a most unsavory reputation with several recorded fatalities. Serums are available that are very effective in alleviating the severe symptoms.

Scorpions abound in humid tropical areas and in hot deserts where they are represented by many species. The giants are great black creatures from tropical Africa frequently seven inches long and the average size for the whole order is about half that length. Thirty or more species are found in the United States, chiefly in the south and southwest, but some penetrate north to Virginia in the east and even farther north in the west, where they range into British Columbia, Alberta, and Saskatchewan.

Other arachnids frequently associated with the true scorpions because of their common names but which for the most part are not closely allied are the following: The pseudoscorpions (order Chelonethi) are tiny forms rarely exceeding one-fourth inch in length that resemble scorpions but have the abdomen rounded behind and without trace of whip or tail. The wind scorpions or solpugids (order Solifuges) are active, tailless creatures notable for the tremendous size of their chelicerae. The whip scorpions (order Pedipalpi), narrow waisted types lacking a caudal sting, are a somewhat heterogeneous group, some having a slender, jointed, whiplike tail and other tailless ones that have the first legs tremendously elongated into lashlike whips.

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SCORZONERA, a genus of composite plants with numerous species, chiefly indigenous to the Mediterranean regions. The flowers are yellow or rarely rose-colored, having many series of involucral bracts, plumose and unequal pappus, and achenes without a beak and generally wingless. *S. hispanica,* sometimes known as viper's grass, has long been cultivated for its tapering, fleshy, edible roots, the dark-brown skins of which have caused it to be called black salsify. The leaves are long and lanceolate with waving edges. Other species are also cultivated for their roots.

SCOT, skŏt, or **SCOTT,** Michael, a medieval Scottish scholar and man of science: b. probably about 1175; d. probably about 1234. He is said to have studied at the universities of Oxford, Paris and Bologna. After a period in the service of Frederick II at Palermo, he continued his studies at Toledo, where he learned Arabic. On leaving Toledo he again repaired to Sicily, where he was closely associated with the Emperor Frederick, to whom he was appointed astrologer. He took orders, and was appointed by Honorius III to the archbishopric of Cashel in Ireland, but declined the post. He was at Oxford in 1230, probably sent by Frederick to bring before the university the translations of Aristotle made by himself and others. Scot was a scholar learned in the science of time, but has been transformed by legend into a magician. As such he is referred to by Dante (*Inferno,* canto xx) and Boccaccio (*Decameron*), and he plays a prominent part in the popular superstitions of the border districts of Scotland. Many works are attributed to him, of which the following have been printed: *Liber Physiognomiae Magistri Michaelis Scoti* (1477); a Latin translation of Aristotle's *De Animalibus* (1496); *Quaestio Curiosa de Natura Solis et Lunae* (1622), on alchemy; and *Mensa Philosophica* (1602), anglicized as *The Philosopher's Banquet* (1614).

SCOT, Reginald or **Reynold,** English writer: b. Scotshall, Kent, probably about 1538; d. 1599. He was a student at Oxford, but returned home without taking a degree and devoted himself to the study of old and obscure mystical authors and the pleasures of gardening. The work on which his reputation is founded is entitled *The Discovery of Witchcraft* (1584), and was directed against the belief in witchcraft, alchemy, astrology and other prevalent superstitions of his time. King James I ordered the first edition of the book to be burned by the common hangman, and attempted a reply to it in his *Demonology.* Refutations were also published by Meric Casaubon, Joseph Glanvil and others.

SCOTCH FIR, or **SCOTCH PINE.** See Pine.

SCOTCH or **SCOTS LAW,** the system of jurisprudence and judicial practice as developed in Scotland. Ancient Scotch law bore a marked resemblance to the law of England, but changes developed so that the two systems differed to a considerable extent as early as the end of the 16th century. Shortly before this the Court of Session, which had been established more than a century before, was abolished and another court, known as the College of Justice, was substituted. The system of legal procedure adopted by this court was modeled after the Roman law, and the judges showed a marked preference for Roman substantive law also. As a result the differences between Scotch and English law grew greater as time progressed, and although in recent years legislation has brought the legal systems of both countries more into harmony, there still exists considerable divergence in procedure, substantive law and terminology. For instance, the term "pursuer" as used in Scotch law is equivalent to "prosecutor" or "plaintiff" in English law. The pleading of the pursuer in criminal actions setting forth the material grounds of the action is called the "condescendence." Offenses are divided into two classes:

«delicts» and «quasi-delicts,» nearly resembling torts in English law. Cases often occur in which it is almost impossible to differentiate between delicts and quasi-delicts. Scotch law divides property into heritable and movable, in marked contrast with English law, which divides it into real and personal, Contracts by the Scotch classification are divided into three classes: Real, consensual and quasi-contracts. A consideration is not essential to the validity of an unsealed contract. «Process» has a much wider application than in English law, being practically equivalent to «practice» or «procedure.» In the law of sales, no distinction is made between conditions and warranties, and the statute of frauds has no application. The law of divorce differs considerably from that of England, the consent of parents not being essential to the validity of marriages of minors; an absolute divorce may be secured by either party for mere desertion (called non-adherence), as well as for adultery, in which latter case the parties may both remarry except with the paramour if mentioned in the decree. Formerly jurisdiction in divorce proceedings was vested in a body of commissaries, but by statute this was changed so that it now vests in the Court of Session.

In Scotland few crimes are constituted by statute, the common law being so construed that if a judge directs an act to be a crime and a jury convicts, such act is a crime. In the past this has served as an instrument of political oppression, but such is apparently not its effect to-day. The summons goes into considerable detail, and is regulated by the Act of 1850. The practice of including the grounds of the action in the summons has been discontinued, such grounds now being contained in the condescendence and pursuer's plea in law annexed to the summons. The usual form of accusation is by indictment drawn by the public prosecutor, and ordinarily a grand jury is impaneled in cases of treason only. Private prosecutions are rare. The old procedure by criminal letters has been abolished. A copy of the indictment, with a list of the witnesses, must be served on the defendant. An action in the Court of Session now commences with a summons by the pursuer. The statement of the defender is called his defenses. The procedure in this court was amended by the Court of Session Act of 1868. The pleadings in the Sheriff's Court are similar to those in the Court of Session, and the procedure is governed by the Sheriff Courts of Scotland Act of 1876. One of the distinctive characteristics of Scotch criminal law is the «not proven» verdict of the jury, which corresponds to the *non-liquet* of the Roman law, and which is permissible in certain cases. In legal effect it is equivalent to «not guilty,» and bars any further action on the same charge, but it falls far short of an acquittal on the reputation of the defendant. Criminal procedure in Scotland was much simplified by an act passed in 1887.

The ordinary appellate tribunal in Scotland for decisions of superior courts and of the lords ordinary is the Court of Session, sitting in two divisions. In criminal cases appeals from inferior courts go to the Court of Session sitting in the High Court of Justiciary. Since the year 1707 the House of Lords has been the final appellate tribunal for Scottish civil causes, but has never acted in criminal cases. See SCOTLAND—*Political Constitution.*

The Court of Admiralty of Scotland was continued at the Union in 1707 for the determination of all maritime cases within the jurisdiction of that court, but in 1830 its civil jurisdiction was transferred to the Court of Session and the Sheriff's Court. The last-named court has also limited criminal jurisdiction.

Jury trials were first used in Scotland for certain forms of civil cases in the 19th century, but are not frequent to-day.

EDWARD F. DONOVAN,
Formerly Editor 'Unabridged Standard Dictionary,' 'Standard Bible Dictionary,' etc.

SCOTCH MUSIC. Much conjectural matter has been written about the origin of Scotch music, discussing, among other questions, whether it was the creation of one of the artist favorites of James III, or was brought over and naturalized by David Rizzio. That much of it is as old at least as the 16th century was proved by a manuscript collection of the tunes in a handwriting and notation which brought them close back to that period. This collection, known as the 'Skene Manuscript,' was edited by a man of scholarly attainments who had devoted himself to musical study — William Dauney, F.S.A., Scotland. His conclusions on their value as preserving the music of the country in its original purity are «The favorable contrast which many of the Scotch airs therein contained present to the dull, tiresome, meretricious productions which from time to time have been palmed off upon the public under that name, and the vitiated copies of the same tunes which have been handed down by tradition alone, are the most gratifying results of its discovery. We are now no longer at a loss for a standard by which we can test the genuineness of our national music, distinguishing the true from the false, the pure ore from all admixture of baser metal.» One of the most prominent features of the Scottish music is the prevalent omission of the fourth and seventh in the scale, and the consequent absence of all semitones; another is the substitution of the descending for the ascending sixth and seventh of the minor scale. Modulation often takes place between the major key and its relative minor, and the melody keeps ever true to the diatonic scale of the principal key, no accidentals being introduced. Many airs open in the major key and close on the minor. Closes are not confined to the tonic, and are found on the third, fifth and sixth, and in Highland music on the second of a major and the seventh of a minor key. Consult Thomson, G., ed., 'Melodies of Scotland, with symphonies and accompaniments, by Pleyel, Kozeluch, Haydn, Beethoven, Hummel and Weber' (6 vols, 1793–1841); Graham, G. F., 'The Songs of Scotland,' and Fulcher, 'Lays and Lyrics of Scotland' (Glasgow 1870).

SCOTCH TERRIER. See DOG; TERRIER.

SCOTER, or SURF DUCK, a duck of the genus *Œdemia,* characterized by a broad short bill curiously swollen, bright-colored at the base of the upper mandible and with a hooked nail. These are the most marine of all ducks, though the American species may also occur about the Great Lakes, etc. They are comparatively weak

fliers but expert divers and feed chiefly upon mollusks and other animals, for which they dive and grope in the mud of shallow waters. The males of all the species are uniformly velvety black, with or without white markings on the head, and wings, and with bright colors on the bill. The females are plain brownish above, grayish below, with dull-colored bills. There are three common American species: the black scoter (*O. americana*), the white-winged scoter (*O. delandi*), and the surf duck or sea coot (*O. perspicillata*); and the European species occasionally wander into our territory. All of these species breed in the far north and winter within the United States as far south as New Jersey and Chesapeake Bay on the Atlantic and California on the Pacific side. A few may linger through the summer in Maine, etc.; and the second species is the most abundant. The females are soot-colored above and brownish-white beneath.

SCOTFORD, John Ryland, American clergyman and editor: b. Chicago, Illinois, Sept. 7, 1888. He was graduated at Dartmouth with the degree of Bachelor of Arts in 1911 and later studied at the Union Theological Seminary. In 1912 he was ordained to the Congregational ministry and thereafter was successively pastor at Kingfisher, Oklahoma, Junius Heights Church, in Dallas, Texas, the First Congregational Church at Waukegan, Illinois, and the Glenville Church of Cleveland, Ohio, until 1927. In 1928 he toured South America and from that year to 1931 he lectured and wrote much about the South American continent. From 1931–1942 he was editorial secretary of the Commission on Missions of the General Council of the Congregational and Christian Churches, and from 1943–1950 he was editor of *Advance*. He has written: *Mating Ministers and Churches* (1930); *Spanning a Continent* (1939); *Together We Build America* (1943); *The Church Beautiful* (1946).

SCOTIA, skō'shà, village, New York, in Schenectady County, altitude 240 feet; on the Mohawk River and the Barge Canal; on the Boston and Maine and the Fonda, Johnstown and Gloversville (motor coach) railroads; 3 miles north of Schenectady; served by Schenectady airport. It is a residential suburb. Settled in 1660, the village was incorporated in 1904; the government is by mayor and council. Pop. (1950) 7,812.

SCOTIA, skō'shĭ-à (Greek *skotia,* darkness), in architecture, a concave molding used especially in Classical architecture, as in the base of columns. The Greek skotia is so-called from the dark shadows cast by the sunken molding at the base of a pillar.

SCOTISM, the philosophical and theological system founded by Johannes Duns Scotus, toward the close of the 13th century and which in succeeding centuries was the greatest of the systems opposed to that of Thomas Aquinas. Scholastic philosophy was the philosophy of Aristotle interpreted, developed and reconciled with the Christian faith. In the latter part of the Middle Ages, scholastic theology, accepting the data of Catholic faith, occupied itself in arranging, defending and drawing deductions from them on the principles of scholastic philosophy. Of this scholastic philosophy and theology, there were two great schools, of which the Thomist found its home in the Dominican, the Scotist in the Franciscan, order. The Nominalist school found adherents in both of these orders and in the church generally, but never exercised an influence like that of the older systems, and really marks the decay of Scholasticism as a whole. The principles of Scotism are stated in the *Opus Oxoniense* and the commentary *The Four Books of the Sentences,* written by Scotus at Oxford. His whole philosophical and theological teaching is here in collected form. Scotists no less than Thomists were, in the strictest sense of the word, scholastics. The one as well as the other accepted the whole tradition of the Church as it was collected by Peter Lombard; to Scotus no less than to Saint Thomas the pope is the supreme guardian and divinely instituted exponent of the deposit of faith left to the church, the highest guide and ruler of the Christian commonwealth. Again Scotus, as well as Thomas, accepts Aristotle as the representative of human reason, the decisive authority in philosophical discussion. The Scotists were greater Realists than the Thomists. To the Thomists no universal exists as such. The essence is only actually found in the individual; it is by a process of the intellect—abstraction—that we separate humanity in general from humanity as it manifests itself in a particular man and reach the idea of man in general. To the Scotists the nature in all individuals of the same species was numerically one. The obvious difficulties of this theory led later Scotists to modify it till it was scarcely discernible from Thomism. The Scotists believed that in individuals there was a "Laeceitas," something which made them individual apart from matter; also "the created will is the total and immediate cause of its volition, so that God in respect thereto has no immediate but only mediate efficacy." The will is like a "free horse," grace like the rider, and the horse can throw its rider; otherwise, the will could not be free, and there would be no possibility of sin. Scotism denies the possibility of proving by reason the immortality of the soul; claims that the Word would have become man, even had there been no fall; that the merits of Christ were not infinite in themselves and from the union of his human nature with the Word, but only from the acceptation of them as infinite on the part of God. Consequently, the system denies the infinite value of the sacrifice of the Mass. The Scotist teaching in regard to the sacraments differed greatly from the Thomist position, admitting only a moral efficacy instead of the physical efficacy taught by the latter. Thomism denied the indifference of any deliberate action while the Scotists reject this reasoning, and hold that the end, and, therefore, the action, might be indifferent. The Scotist philosophy and theology are now abandoned but many of its opinions have been adopted. The Scotist opinion on the Immaculate Conception finally triumphed, and its theory on the Incarnation has recommended itself, as a philosophical view of that mystery, even to writers of note outside the church.

Consult *The Catholic Encyclopedia,* **vol. 13, New York (1912).**

SCOTISTS. See SCOTUS, JOHANNES DUNS; SCHOLASTICISM.

SCOTLAND, skŏt'lănd, **UNITED KINGDOM,** the northern division of the island of Great Britain, extending between lat. 54° 38′ and 58° 40′ 30″ N., and long. 1° 46′ and 6° 8′ 30″ W. It is separated from England substantially by the Solway, Cheviots and Tweed, the border isthmus being about 60 miles across; but the irregular boundary line, the historic Border-land measuring fully 100 miles. On all other sides it is bounded by the sea. The greatest length, from north-northeast to south-southwest, between Dunnet Head and the Mull of Galloway, is 287 miles. The breadth varies from 140 miles to less than 30, the latter in the north, between Dornoch Firth and Loch Broom. Few points in the mainland are more than 40 miles from the sea, the country being deeply penetrated by inlets. The country was formerly divided into a number of districts, many of the names of which are still familiar, such as Lothian, Tweeddale, Galloway, and Breadalbane; for political purposes, it is divided into counties. Scotland has an area of 30,533 square miles. The population was estimated to amount to 5,067,261 on 31 Dec. 1941. The capital is Edinburgh (pop., mid-1940 est., 475,500) and the largest city Glasgow (1,131,800); other large cities are Aberdeen (180,800), Dundee (179,000), Paisley (92,700), Greenock (78,948), Motherwell (64,708), and Clydebank (48,200). (For map see under Great Britain.)

Islands and Coasts.—The islands of Scotland are said to number altogether nearly 800. On the east coast they are few and small; but on the northeast are the two large groups, the Orkneys and Shetlands, the former numbering 52 islands, 28 permanently inhabited; the latter 100 islands, 29 inhabited; while on the west coast the islands are large and numerous. Here the Hebrides (q.v.) extend for 200 miles from the north to south, and are divided into the Inner and Outer Hebrides, the former lying close to the western coast of the mainland and stretching from Skye to Islay; the latter, parted from the Inner Hebrides by the straits of the Minch and the Little Minch, comprise the long chain of islands from Lewis to Benbecula. Enclosed in the Firth of Clyde are the islands of Arran, Bute and the Cumbraes, forming a county by themselves. The west coast of the mainland is generally a wild, deeply indented mountain-wall, presenting a series of inlets or sea lochs, while toward the middle the coast is cleft by two great inlets with openings to the southwest, the Firth of Lorn and its continuation Loch Linnhe, and the Firth of Clyde and its ramifications running far inland. The east coast is sometimes low and sandy, but is often formed by steep rocky cliffs of considerable elevation, the chief inlets being the Firths of Forth and Tay, and the Moray Firth, Cromarty Firth, etc.

Orography.—From the configuration and geological structure the country divides into three divisions, the Highlands, central Lowlands and southern Uplands. The first of these divisions lies north of a line stretching in a southwesterly direction from the coast of Kincardineshire to the Firth of Clyde; the third is the country south of a line drawn from Dunbar southwesterly to Girvan; the country between these lines forms the central Lowlands. The Highland division is remarkable for the number and elevation of its mountain-masses, many of the summits being over 4,000 feet high. The mountains best known by name are the Grampians, which form a system or series of masses covering a large area and culminating on the west coast in Ben Nevis, 4,406 feet high; while 55 miles to the northeast rises a remarkable cluster of summits reaching in Ben Macdhui the height of 4,296 feet. The Grampians and their connections are separated from the mountains farther to the north by Glenmore or the Great Glen of Scotland, a remarkable depression stretching quite across the country from sea to sea, and forming, by the series of lakes occupying it and the Caledonian Canal connecting them, a waterway from the west coast to the east. The southern Uplands are also essentially a mountainous region, summits of over 2,000 feet being frequent, though none exceed 3,000 feet above the sea. The central region, though much less elevated than the other two divisions, has none of the monotony usual in flat countries. Though occupying not more than a sixth of the whole surface, the fertility of the soil and its mineral treasures make this part by far the wealthiest and most populous. The present form of the land surface of Scotland is the effect of erosion or denudation. The country was at one time an elevated tableland, the upper surface of which is indicated by the summits of the mountain-masses, but has been deeply trenched and furrowed in all directions by the erosive action of water, ice and frost. The slope of the ancient plateau is determined by the direction of the principal river; in the northern part it is chiefly toward the east, in the southern more equally east and west.

Hydrography.—The chief rivers flowing east to the North Sea are the Tweed, Forth, Tay, South Esk, North Esk, Dee, Don, Deveron. Spey, Findhorn, etc.; those entering the sea on the west are the Clyde, Ayr, Doon, Dee, Nith, Annan and Esk. The Clyde in its lower course carries a vast traffic, this being rendered possible chiefly by dredging. Many of the rivers are valuable from the numbers of salmon they produce. A striking feature of the country is the great multitude of lakes varying in size from Loch Lomond (28 square miles) to the pool-like mountain tarns. In the northern Highlands almost every glen has its lake and every mountain hollow is filled by a stream or spring. Among the more noted are lochs Lomond, Katrine, Tay, Earn, Rannoch, Awe, Shiel, Laggan, Lochy, Ness, Maree, Shin, in the western and northern Highlands; Loch Leven, in the central Lowlands; and Saint Mary's Loch, lochs Ken, Dee and Doon in the southern Uplands.

Geology.—The older or palaeozoic rocks predominate almost everywhere in Scotland. The Highlands are composed almost entirely of crystalline schists, gneiss and quartzites; the central Lowlands of Old Red Sandstone, Carboniferous and Permian strata; the southern Uplands mostly of rocks of Silurian Age. In certain localities remains of secondary formations are represented over small spaces, while volcanic rocks cover considerable areas. Granite exists in great masses in many localities, and in some parts is extensively quarried. The most valuable mineral region is the central Lowlands, where coal and iron exist in such quantity as to make this one of the most important mineral fields of Great Britain

SCOTLAND

Right: Scottish bagpiper, Trossachs district. *Center:* The mists in the Highland mountains often obscure roads and familiar landmarks. This is a scene in the Trossachs. *Bottom:* The castle at Inverness and the bridge over the river Ness. The river empties into Moray Firth and the North Sea at the city.

Philip Gendreau, N.Y

SCOTLAND

Left: A summer view looking across a field of heather in Aberdeenshire. *Center:* View of Edinburgh, with Edinburgh Castle looming in the righthand corner of the picture. *Bottom:* Famous Gretna Green where many elopers have been married.

Philip Gendreau, N.Y

Population.—The census of 1801 showed the population numbered 1,608,420. Within 50 years it had increased to 2,888,742, and in 1901 it stood at 4,472,103. The population at the 1921 census was 4,882,497, but it dropped during the next decade by 39,517, the figure for 1931 being 4,842,980. Because of conditions prevailing during the Second World War, no census was taken in 1941, the succeeding decennial period. However, an estimate as of 31 Dec. 1941 placed the population at 5,067,261, though this figure excluded casualties among civilians and such factors as migration and the ingress of evacuees. Three quarters of the population was concentrated in one fifth of the area of the country, the seven counties out of 33 in Scotland which were most densely settled being Aberdeen, Angus, Ayr, Fife, Lanark, Midlothian, and Renfrew. (The county of Angus was known until 1928 as Forfarshire.) In 1942 births totaled 90,697 and deaths 64,963, this excess of births being at the rate of 5.1 per 1,000 of the population. During 1942 there were 47,514 marriages; this represented a rate of 9.5 per 1,000 of the population, as compared with an average of 6.9 during the decennial period 1921–30. "Gretna Green marriages," an irregular form consisting of simple declaration by the contracting parties, became illegal after 30 June 1940, a new form of civil marriage being instituted. Deaths in 1942 numbered 64,963, a rate of 13.0 per 1,000 as compared with 13.7 during 1921–30.

The counties of Scotland, their county seats, areas, and populations as estimated in mid-1940 are shown in the following table:

Counties and county seats	Area sq. mi.	Population mid-1940
Aberdeen (Aberdeen)	1,955	327,800
Angus (Forfar)	873	272,900
Argyll (Lochgilphead)	3,213	62,000
Ayr (Ayr)	1,128	298,700
Banff (Banff)	640	53,200
Berwick (Duns)	460	26,100
Bute (Rothesay)	217	16,300
Caithness (Wick)	685	25,700
Clackmannan (Clackmannan)	47	33,200
Dumbarton (Dumbarton)	241	158,800
Dumfries (Dumfries)	1,062	81,500
East Lothian (Haddington)	280	48,800
Fife (Cupar)	492	286,600
Inverness (Inverness)	4,088	81,100
Kincardine (Stonehaven)	383	25,800
Kinross (Kinross)	72	7,000
Kirkcudbright (Kirkcudbright)	897	30,200
Lanark (Lanark)	881	1,643,600
Midlothian (Edinburgh)	367	565,800
Moray (Elgin)	476	41,000
Nairn (Nairn)	195	8,300
Orkney (Kirkwall)	926	21,700
Peebles (Peebles)	554	14,100
Perth (Perth)	2,527	120,400
Renfrew (Paisley)	245	327,100
Ross and Cromarty (Dingwall)	3,078	61,900
Roxburgh (Jedburgh)	665	45,400
Selkirk (Selkirk)	257	21,900
Shetland (Lerwick)	550	19,700
Stirling (Stirling)	447	175,400
Sutherland (Dornoch)	2,027	15,200
West Lothian (Linlithgow)	120	83,900
Wigtown (Wigtown)	485	29,700
Total	30,533	5,030,800

Two fifths of the population (2,000,000) live in the four cities of Edinburgh, Glasgow, Dundee and Aberdeen; 26 towns with populations ranging from 92,000 to 15,000 contain nearly 1,000,000 between them; 66 medium towns (15,000-5,000) account for over 500,000; and the remainder live in villages or in the wide, open spaces of the Highlands and the southern Uplands.

Education.—Scotland has had a national system of elementary education for over two centuries, a school having been established in every parish by a law of 1696 (where such a school was not already established), according to a system proposed by John Knox long before. The Scottish Education Department, distinct from that of England and Wales, supervises the work of local education authorities in the counties and burghs. An advisory council assists the department, and teachers, parents, and other citizens constitute the local bodies. Legislation of 1918 and 1929 increased the powers of the central authority and made all primary and secondary education free; amending legislation enacted in 1936 permitted local education authorities to subsidize privately-owned nursery schools, and raised the school-leaving age from 14 to 15 with effect from 1 Sept. 1939. The imminence of war with Germany caused postponement of the latter step. Secondary education was given in "Junior Secondary" and "Senior Secondary" schools, the former for those leaving at 15, and the latter for those remaining a further three years. Children medically or mentally unfit were taught in special classes or institutions, and in some areas medical treatment, food and clothing were provided. Technical education was available in the secondary day schools, at Continuation (evening) Classes, at Junior Instruction Centers (for unemployed adolescents), and at Central Institutions, 12 in number, which functioned both by day and in the evening.

On 26 Oct. 1944, a bill was presented to Parliament applying to Scotland the government's policy for the development of education along the lines contemplated in England and Wales, and also making a number of other changes which affected only the Scottish system. Education in nursery schools and classes was, for the first time, to be made part of primary education. School-leaving age was to be 15 (as had already been provided in the act of 1936), and it was to be raised "as soon as practicable" to 16; traveling facilities were to be provided, as well as milk and meals in all schools; there were to be additional facilities for recreation, social and physical training, medical inspection (especially those suffering from a disability of mind or body); and employment likely to interfere with a child's education was to be prohibited or restricted. The bill also proposed the founding of "Junior Colleges" for the compulsory part-time education of young persons aged 15 to 18.

In addition to educational facilities provided in schools wholly financed by the government, there were also privately-conducted grammar schools and like institutions, most of which received financial assistance from the state and were subject to some measure of control and supervision. Adult education was fostered by the Scottish Education Department, the British Broadcasting Corporation and such private bodies as Labor Colleges and the Workers' Education Association.

The state made annual grants, too, to the Scottish universities, autonomous institutions which also derived income from the Carnegie Trust (half of its annual income of £100,000 being devoted to that purpose and half to assistance for needy pupils), from endowments, and from students' fees. About two thirds of the students came from the public elementary

schools and were in receipt of financial assistance. The first university was that of Saint Andrew, dating from 1411; next came that of Glasgow (1450), then Aberdeen University (1494) and lastly Edinburgh University (1582). The medical school at Edinburgh attracts students from all over the world. The Presbyterian and Roman Catholic churches maintain several theological colleges; and these and other denominations conduct colleges for training teachers for their own schools.

Religion.—Presbyterianism has larger support in Scotland than any other form of the Christian faith. The Church of Scotland (Presbyterian), which dates back to 1560, has frequently been disrupted by seceders. The Free Church and the United Presbyterian Church, each comprising groups of dissident church congregations, merged in 1900 to constitute the United Free Church, and the latter joined the Church of Scotland in 1929. Second largest religious body is the Roman Catholic Church, and others include the Episcopal Church in Scotland (adjunct of the Church of England), Baptists, Congregationalists, Methodists and Unitarians.

Local Government.—The Secretary of State for Scotland, the Lord Advocate, and the Solicitor General for Scotland represent the country in the British cabinet. The first-named heads the Scottish Office, in London, and, in Edinburgh, the Department of Agriculture, the Education Department, the Department of Health, and the Home Department. In 1929 local government in Scotland was reorganized drastically, bringing the system into conformity with that prevailing in England and Wales. County councils, and burghs having populations in excess of 20,000, became the principal local authorities, concerned, as a general rule, with administration of the poor law, health services, police forces, highway maintenance, and education; Edinburgh, Glasgow, Aberdeen, and Dundee, each termed a «county of a city,» remained responsible for educational matters within their confines, and those burghs which had their own police bodies at the time the 1929 law became effective continued to maintain them independently of the county councils. Nairn was combined with Moray, and Kinross with Perthshire, for administrative purposes, and thus, while there were 33 counties in Scotland, only 31 county councils functioned.

Finances.—While the Scottish fiscal system is in large part that of the United Kingdom, local authorities have considerable powers for raising revenue for local purposes. The two types of local taxes were termed "valuation" and "assessment," the equivalents of which in England and Wales, were, respectively, "assessment" and "rating." Local authorities could also raise loans for such purposes as the provision of airports, public bathhouses, cemeteries, electricity supply, gasworks, harbors, piers, docks, canals, markets, and local transportation services. The central government also made block grants to local authorities in Scotland for highway, health and like services, and, in addition, grants were made from the Ministry of Education for educational purposes, from the Ministry of Health for housing, and from the Home Office for police expenses.

Agriculture.—Through the 20 years immediately preceding the Second World War, the central government of the United Kingdom financed the purchase of many large estates and farms for subdivision among small farmers, who were also assisted with implements and stock. The result was that by the year 1939 nearly half of the 74,291 farms in Scotland were from five to 50 acres in extent, and less than 2,500 were larger than 300 acres. Oats are the principal cereal crop, and the only one available on the moist oceanic (western) border. Wheat and barley are grown mostly in the Lothians, Fife and the Merse of Berwick, and potatoes, turnips, swedes, and sugar beet are other crops of the east coast. Important fruit-growing districts are the Carse of Gowrie, and around Blairgowrie and Coupar-Angus. The mountain pastures of the southern Uplands and the lower hillsides in the Highlands support sheep. Notable breeds of cattle are the Ayrshire (a dairy breed), the Aberdeen-Angus (a black-polled beef stock), West Highlanders (also termed the Kyloe breed), and black-polled Galloway Shorthorns. Clydesdale is the originator of a famous breed of draft horses, and Shetland and Highland ponies are well known. Work on farms was made more attractive during 1937–38 when wage-rates were stabilized and vacations with pay guaranteed by law, and in 1939, with the prospect of a wartime curtailment of food imports into Great Britain, the government subsidized Scottish farmers in order to increase production and imported large stocks of agricultural machinery for them. During the Second World War, the acreage under crops in Scotland was vastly increased, the government assisting farmers with mechanized equipment and crews, and organizing the Women's Land Army, a conscripted force, to supplement farm labor.

Fisheries.—Both the freshwater and sea fisheries of Scotland are important, especially on the eastern coast. Aberdeen is the chief fishing center; others are Peterhead, Wick, and, on the west coast, Stornoway. The principal food fishes are herring, especially those of Loch Fyne; haddock, flat fish, notably Forth flounders, and cod. Fishing is also carried on for salmon, grilse, and sea trout. Considerable markets for Scottish herring exist in the countries of northwestern Europe.

Mining.—The mineral region of Scotland is the central Lowland. The largest coalfields were for long those in Lanarkshire, and others are in Ayrshire, Fife, the Lothians and Stirling. With exhaustion of the Lanarkshire coalfields already in sight, during the Second World War a new, rich field was being opened up to the southeast of Edinburgh, in what had been primarily an agricultural region. In common with a procedure adopted in England and Wales, during 1942 all coal deposits in Scotland were purchased from private owners by the government; companies owning mine-plant properties continued to operate them, henceforth paying royalties on coal produced to the government rather than to individuals. While operational and financial control was still retained by the operating companies, the government secured over-all control of production. With groups of coal mines placed under the actual management of experts responsible not to the mine operators but to the government, wage rates were increased, national minimum wages were established for the various types of mine workers, an output bonus was introduced, and permanent

machinery was set up both for negotiation and arbitration. Because of the critical shortage of manpower for the coal industry, during the Second World War, in Scotland, as elsewhere in the United Kingdom, men were drafted for work in the mines from December 1943, all new registrants for the armed forces becoming subject to a ballot for mine work.

The iron fields of Scotland lie near the coal, in the counties of Ayr, Lanark, Linlithgow, Renfrew, Fife, Midlothian, and Stirling. Three quarters of the oil shale is mined around Linlithgow, and the remainder in the vicinity of Edinburgh. Other important mineral products are the red and gray granite of Aberdeenshire; limestone is found principally in Fife and Midlothian; slate, chiefly in Argyll, some in Perth; lead and sandstone, in Lanark and Dumfries; fire clay, principally in Lanark and Stirling; and limestone, in Fife and Midlothian.

Manufactures.—The most important industries are those of metals and machinery, shipbuilding and textiles. Glasgow is the chief seat of all industries. After the First World War, the production of iron and steel in Scotland slumped as badly as it did in England and Wales, and recovery did not set in until 1937, when a large program for defense was initiated. The low-grade phosphoric ores had, for many years, been supplemented to a considerable extent by ores of high grade imported from abroad, and though considerable reorganization of manufacturing processes had been undertaken, by the time war once more occurred in 1939 some 30 per cent of all ore used in steel manufacture came from overseas. Belgium was the source of the sand employed in manufacture until war came, when Scottish sands were used perforce on a large scale. The virtual cessation of ship construction brought acute distress to many towns along the Clyde, within the Glasgow district and outside it, as well as in the shipyards on the east coast at Dundee, Fraserburgh, Peterhead, and elsewhere. Nevertheless, in the 1930's, largely with the aid of government subsidies, Clyde shipbuilders were enabled to construct the *Queen Mary,* the *Queen Elizabeth,* and other great liners. During the Second World War, Scottish yards (as, too, those in other parts of the United Kingdom) concentrated upon the building of warships and special types of merchant vessels, and upon repair to damaged shipping, leaving to the United States the execution of the vast program of mass-produced merchant vessels. However, Scottish yards adopted many American shipbuilding practices in the course of the war, in particular, extending rapidly the use of automatic welding machines, of pre-fabrication and of standardization.

The cotton industry centers chiefly in Glasgow and Paisley, the latter being known particularly for its threads; Aberdeen and Perth, among others, also have cotton mills, however. The woolen manufacture is settled in Stirling, Kilmarnock, Bannockburn, and Paisley, while the wool produced on the southern Uplands, combined with the presence of water as a motive-power, helped to locate the manufacture of woolen cloths in the towns of Hawick, Galashiels, and Selkirk, in the Tweed valley. Kilmarnock and Stirling are also important for their carpet manufactures, and Alloa for its woolen yarns. The linen industry, long carried on in Scotland, began at Glamis, in the county of Angus, in 1790; it has since remained in several towns of the county, including Dundee, which also specializes in jute, in Arbroath, Brechin and Forfar. Linens of the finest quality are produced in Dunfermline, and sewing threads are manufactured on a large scale at Paisley. After the First World War, the jute industry of Dundee greatly increased, and Kirkcaldy became the center of the linoleum industry in Scotland. The manufacture of silk, artificial silk, hosiery and lace are also of importance.

A special quality in the water assisted in developing paper manufacture in Midlothian during the 17th century, and subsequently the industry was extended to towns in the valley of the Esk, and to others in the vicinity of Edinburgh. The last-named ranks second only to London as a great printing center of the British Isles, and a considerable printing industry has also grown up in Glasgow. Chemicals are also made in Glasgow and neighboring towns, and sugar refineries are concentrated for the most part at Greenock, while Dundee is famous for its cakes and jams. The distilleries of Argyll, Banff, and Inverness produce the well-known Scotch whisky, while the best beers and ales come from the breweries of Alloa and Edinburgh. During the Second World War, the industrial workers of Scotland labored cheerfully for long periods with a total disregard of maximum hours and other limiting factors; their willingness is evidenced by the fact that in 1943, in all of Scotland, the time lost in trade disputes in every industry was less than one third of a day per worker in the year.

Early in 1942 the government set up a Scottish Council on Industry, representing local authorities, chambers of commerce, organized workers, and financial institutions, to plan the country's postwar industrial development. Numerous committees were created to consider such projects as light engineering, canning, transportation, the white fish and plastics industries the manufacture of fine chemicals and house fittings, and the crofter woolen industry. Through the efforts of this body, by the middle of 1944, with the war still in progress in Europe, some 500 new manufacturing plants were in production, the buildings and necessary equipment costing about £11,000,000. As a further incentive to establishment of new industries in the Highlands, a scheme to harness the water-power resources at a total cost of £6,000,000 was authorized under the Hydro-Electric Development Act of 1943. By March 1944, 102 hydroelectric projects had been approved for Perthshire, Dumbartonshire, Argyllshire and Inverness-shire having a potential annual output of 6,274 million units of power; one power-station, to generate 100,000,000 units a year, was to be located on Loch Lomond, between Ardlui and Tarbet, and Loch Sloy was to have Scotland's biggest dam (1,200 feet long and 150 feet high).

Overseas Trade.—Although a large proportion of goods consumed in Scotland are now brought into the country by rail from England, the indented coasts, and deep, inrunning estuaries, greatly favored the past development of Scottish commerce, and much of it still sails directly into and from the fine ports. The western ports trade chiefly with the Americas, the west of England and Ireland; the eastern ports with northwestern Europe. Into the ports of the Clyde are brought bacon, ham, grain, flour,

tobacco, livestock, leather, lard, timber, and iron ore. Representing foreign imports in the eastern parts are butter, grain, flour, eggs, linen, yarn, and timber. The exports in either case are almost identical in character with British exports generally. Glasgow is by far the busiest port. In volume of trade it is followed by Greenock and Leith; and other leading ports are Aberdeen, Ardrossan, Ayr, Burntisland, Dundee, Grangemouth, and Methil.

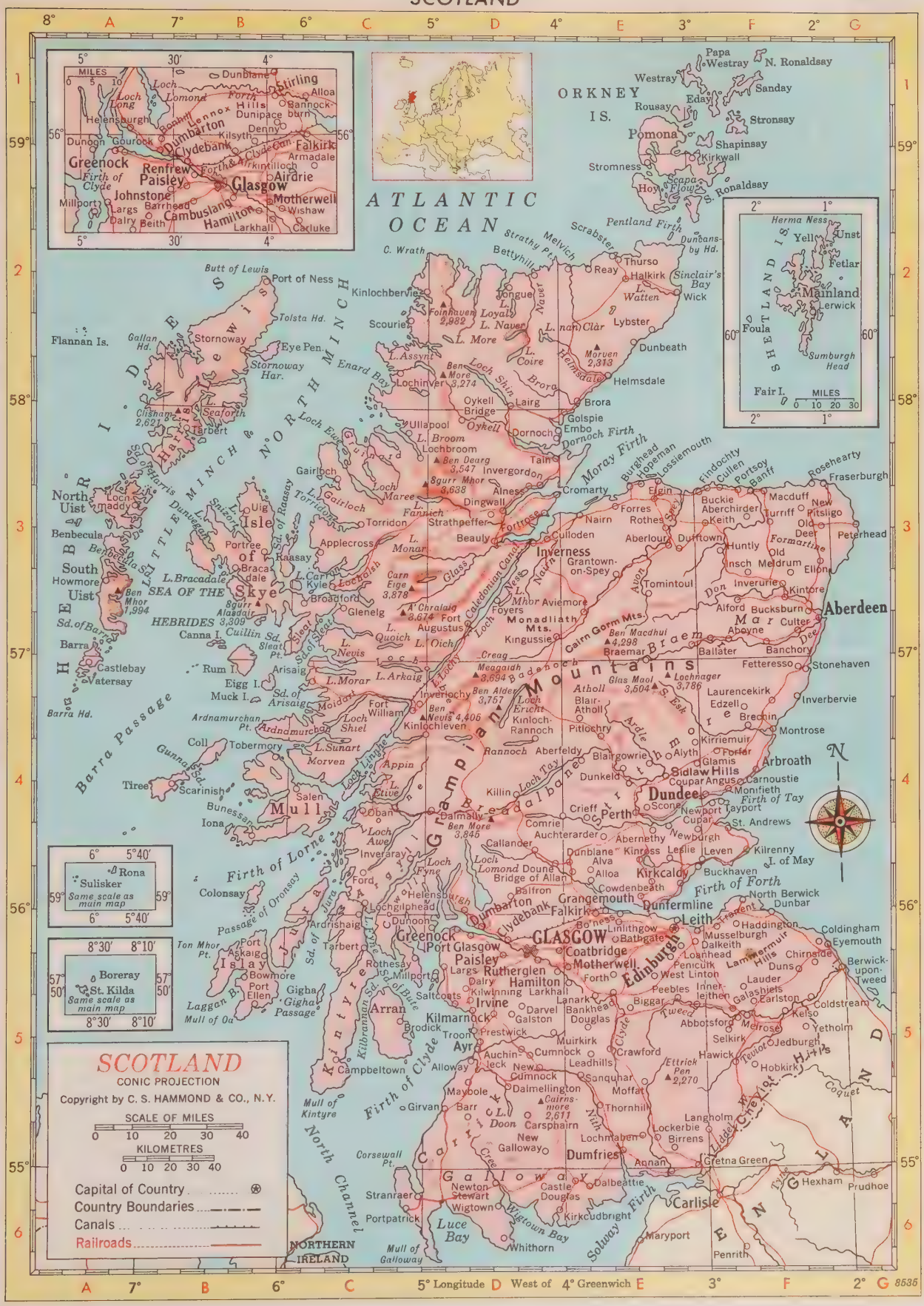
Communications.—Railroad lines reach Edinburgh and Glasgow from the south by skirting round the southern Uplands through the eastern edge of the plain, and, by means of river valleys, penetrating the heart of the southern Uplands themselves, while the flat country between Edinburgh and Glasgow made railroad construction easy. Northward, connection from Glasgow and Edinburgh is provided by the North British system (since 1921 part of the London and North Eastern Railway), which crosses the rivers Forth and Tay by two magnificent bridges, and runs along the flat coastal sill to Aberdeen; thence the Great Northern of Scotland (also merged into the London and North Eastern Railway) carries it on to Elgin and to Inverness. In 1921 the London, Midland and Scottish Railway absorbed the Caledonian, another route north which enters Strathmore through the gap between the Campsie Falls and Ochils, and continues through Perth and Forfar to the coast at Montrose, whence it runs on to Aberdeen. The Highland line (likewise taken into the system of the London, Midland and Scottish Railway in the same year) penetrates from Perth up the valley of the Tay and of the Garry to Inverness, whence it continues north to Wick and Thurso. Canals in Scotland, having a combined length of 184 miles, number three. The Caledonian connects the nearly continuous line of lochs which fill Glenmore, and is used principally for tourist traffic, as is the Crinan Canal across the peninsula of Kantyre; they are national property. A deep depression secured the construction in 1790 of the Forth and Clyde Canal, between Bowling and Grangemouth; it passed into railroad ownership, and eventually was acquired by the London and North Eastern Railway. Highways in Scotland have a total length of 25,873 miles. The main routes ("trunk roads"), 1,188 miles in length, are maintained and improved at the cost of the central government; county roads (21,898 miles) are similarly maintained by the county councils; and the remainder are the responsibility of the burghs. Scotland became of considerable importance in transoceanic aviation during the Second World War. From the airport near Prestwick a scheduled service to Stockholm, Sweden, was inaugurated, and it was in constant use by planes crossing the Atlantic to North America.

Scotland in the Second World War.—The Scottish people supported the war effort with a zeal that was not anywhere excelled. Farmers vastly increased the acreage under the plough, shipyards and manufacturing plants went into maximum production (largely with the aid of unskilled workers and women), and the accomplishments of Scottish regiments on the fighting fronts were watched with national pride. Scotland provided a haven, too, for children evacuated from danger zones in England, while Norwegian, Polish and other troops from countries overrun by the Germans found on Scottish soil the facilities to reorganize and retrain in order to meet the enemy once more.

Scotland suffered, too, from the attacks of the enemy. The Firth of Forth, not the Thames estuary, was the first part of Britain to experience enemy attack from the air, the cruisers *Edinburgh* and *Southampton,* lying near the Forth Bridge, being bombed on 16 Oct. 1939. On the following day the first bomb to fall on British soil exploded at Hoy during an attack on nearby Scapa Flow, the great naval base at that period sheltering the Grand Fleet. The first civilian was killed at Bridge of Waith, in the Orkneys, on 16 March 1940; and on 10 April the first bomb on the mainland of Britain for 22 years (since the First World War) fell near Wick. On 12 July 1940, following the surrender of France, Aberdeen, which became Scotland's most frequently raided city, had its first damaging raid when a single plane dropped 20 bombs which killed 34 people. Glasgow had its first attack on 19 July; the city and surrounding area were raided four times on 18 September, when the Battle of Britain was at its height; and bombs were dropped in many areas of Scotland during the night of 23–24 October.

However, Scotland endured its heaviest attacks during the spring of 1941. Through the nights of 13–14 and 14–15 March, for some eight hours at a stretch, the docks and shipyards along the Clyde, and particularly at Clydebank, were bombed and burned; only 12 of Clydebank's 12,000 houses escaped damage, and all but 2,000 of the wartime population of 55,000 had to leave the town. Clydeside's second big raid occurred on the nights of 5–6 and 6–7 May, Paisley and Greenock being the chief sufferers. Enemy aerial attacks on Scotland dropped sharply from mid-May 1941. During the first seven months of 1942 there were 20 attacks on the country, the majority on the northeast coast. Altogether Aberdeen was raided on 32 occasions, and Peterhead and Fraserburgh each 23 times, earning for them the unenviable title of Scotland's front-line towns. There were no attacks from August 1942 to February 1943; and there were only four raids thereafter down to the close of 1944. A total of 6,600 high explosive bombs and 300 parachute mines were dropped in Scotland. The total killed (or missing, believed killed) was 2,298, those injured and detained in hospitals numbered 2,167, and 3,558 were slightly injured.

Civil History.—The country now called Scotland emerges from prehistoric obscurity during the Roman occupation of Britain, though for many centuries little is known of its history. It is supposed that the earliest inhabitants of the country were a non-Aryan race resembling the Iberians, and typified now by the Basques. A Celtic (and Aryan) people seem subsequently to have entered the country, and to have gained predominance over the non-Aryans, the combined people occupying at the Roman invasion most of the country north of the Forth and Clyde estuaries, which was called Caledonia (q.v.) by the Romans, and its people Caledonians. The southern part of the country was inhabited by another Celtic race, the Brythons or Britons, of the same blood as the Welsh. The descendants of the Caledonians were afterward called Picts, and were the predominant people in North Britain at the begin-


SCOTLAND
ATLANTIC OCEAN
ORKNEY IS.
Papa Westray
N. Ronaldsay
Westray
Sanday
Eday
Rousay
Stronsay
Pomona
Shapinsay
Kirkwall
Stromness
Scapa Flow
S. Ronaldsay
Hoy
Pentland Firth
SHETLAND IS.
Herma Ness
Yell
Unst
Fetlar
Mainland
Lerwick
Foula
Sumburgh Head
Fair I.
Dunsby Hd.
Sinclair's Bay
Wick
Thurso
Reay
Halkirk
Lybster
Dunbeath
Helmsdale
Brora
Golspie
Embo
Dornoch
Dornoch Firth
Tain
Invergordon
Alness
Dingwall
Cromarty
Burghead
Hopeman
Lossiemouth
Findochty
Cullen
Portsoy
Banff
Rosehearty
Fraserburgh
Macduff
New Pitsligo
Turriff
Old Deer
Peterhead
Buckie
Aberchirder
Keith
Forres
Rothes
Nairn
Culloden
Aberlour
Dufftown
Huntly
Formartine
Insch
Meldrum
Ellon
Inverness
Grantown-on-Spey
Tomintoul
Inverurie
Kintore
Alford
Bucksburn
Aberdeen
Mar
Culter
Aboyne
Ballater
Banchory
Fetteresso
Stonehaven
Laurencekirk
Edzell
Inverbervie
Brechin
Montrose
Kirriemuir
Forfar
Arbroath
Glamis
Sidlaw Hills
Carnoustie
Monifieth
Firth of Tay
Dundee
Cupar
Angus
Newport
Tayport
St. Andrews
Perth
Scone
Crieff
Comrie
Auchterarder
Abernethy
Newburgh
Callander
Dunblane
Alva
Alloa
Kinross
Leslie
Leven
Kilrenny
J. of May
Kirkcaldy
Buckhaven
Cowdenbeath
Dalmeny
Firth of Forth
North Berwick
Dunbar
Dunfermline
Grangemouth
Falkirk
Clydebank
Dumbarton
Leith
Tranent
Haddington
Coldingham
Eyemouth
Musselburgh
Dalkeith
Loanhead
Penicuik
Lammermuir Hills
Chirnside
Duns
Berwick-upon-Tweed
Lauder
Galashiels
Earlston
Coldstream
Kelso
Melrose
Yetholm
Jedburgh
Hawick
Teviot
Selkirk
Abbotsford
Tweed
Biggar
Peebles
Innerleithen
Linlithgow
Bathgate
Coatbridge
Motherwell
Edinburgh
GLASGOW
Greenock
Port Glasgow
Paisley
Rutherglen
Hamilton
Lanark
Forth
West Linton
Carnwath
Carstairs
Carstairs Junction
Lesmahagow
Douglas
Douglas Water
Abington
Biggar
Tweed
Clyde
Irvine
Kilmarnock
Darvel
Galston
Ayr
Prestwick
Troon
Muirkirk
Crawford
Auchinleck
Cumnock
Leadhills
Sanquhar
Ettrick Pen 2,270
Hobkirk
Coquet
Cheviot Hills
Maybole
Girvan
Barr
Dalmellington
Cairnsmore 2,611
Moffat
Thornhill
Langholm
Lockerbie
Birrens
Lochmaben
Carsphairn
New Galloway
Dumfries
Annan
Gretna Green
Hexham
Prudhoe
Tyne
Carlisle
Maryport
Penrith
Solway Firth
Luce Bay
Whithorn
Wigtown
Wigtown Bay
Newton Stewart
Castle Douglas
Kirkcudbright
Dalbeattie
Stranraer
Portpatrick
Corsewall Pt.
Mull of Galloway
North Channel
NORTHERN IRELAND
Mull of Kintyre
Firth of Clyde
Arran
Brodick
Kilbrannan Sd.
Kintyre
Campbeltown
Alloway
Ayr
Saltcoats
Ardrossan
Largs
Millport
Cumbrae
Isle of Bute
Rothesay
Port Bannatyne
Kames
Tighnabruaich
Kyles of Bute
Colintraive
Dunoon
Gourock
Helensburgh
Loch Long
Loch Lomond
Ben Lomond 3,192
Ben Vorlich 3,092
Ben Venue 2,393
Ben Ledi 2,882
Ben More 3,843
Ben Lawers 3,984
Ben Alder 3,757
Ben Nevis 4,406
Ben More 3,274
Ben Dearg 3,547
Ben Hope 3,040
Ben Klibreck 3,154
Ben Loyal 2,504
Foinhaven 2,982
Morven 2,313
Cairn Gorm Mts.
Ben Macdhui 4,298
Braeman
Cairn Toul 4,241
Sgor an Lochain Uaine 4,095
Beinn a' Bhuird 4,296
Beinn a' Ghlo 3,671
Glas Maol 3,504
Lochnagar 3,786
Mount Keen 3,077
Grampian Mountains
Meagaidh 3,694
Creag Meagaidh 3,700
Aonach Beag 4,060
Ben Nevis 4,406
Glencoe
Ballachulish
Kinlochleven
Fort William
Ardnamurchan Pt.
Loch Shiel
Loch Eil
Loch Linnhe
Loch Leven
Loch Etive
Loch Awe
Loch Fyne
Loch Tay
Loch Rannoch
Loch Erich
Loch Quoich
Loch Arkaig
Loch Morar
Loch Nevis
Loch Hourn
Loch Duich
Loch Alsh
Loch Carron
Loch Kishorn
Loch Torridon
Loch Maree
Loch Ewe
Loch Gairloch
Loch Broom
Loch Inver
Loch Assynt
Loch Shin
Loch Naver
Loch More
Loch Eriboll
Loch Laxford
Loch Inchard
Loch Glendhu
Loch Stack
Loch Eriboll
Kyle of Lochalsh
Kyle Rhea
Kyle of Sutherland
Kyle of Tongue
Caledonian Canal
Glen Mor
Glen Garry
Glen Roy
Glen Spean
Glen Coe
Glen Shiel
Glen Affric
Glen Cannich
Glen Strathfarrar
Glen Carron
Glen Torridon
Glen Shin
Glen Brora
Glen Loyne
Glen Quoich
Glen Dochart
Glen Lyon
Glen Tilt
Glen Clova
Glen Isla
Glen Prosen
Glen Esk
Glen Doll
Glen Muick
Glen Gairn
Glen Avon
Glen Livet
Glen Rinnes
Glen Fiddich
Glen Grant
Glen Rothes
Glen Spey
Glen Urquhart
Glen Moriston

SCOTLAND

Abbotsford ..... E 5
Abelour, 1,153 ..... E 3
Aberchirder, 800 ..... F 3
Aberdeen, 182,714 ..... G 3
Aberfeldy, 1,523 ..... D 4
Abernethy, 675 ..... E 4
Aboyne, 1,009 ..... F 3
A'Chralaig (mt.) ..... C 3
Airdrie, 30,308 ..... B 2
Alford ..... F 3
Alloa, 13,436 ..... C 1, E 4
Alloway ..... D 5
Alness ..... D 3
Alva, 4,107 ..... E 4
Alyth, 2,072 ..... E 4
Annan, 4,631 ..... E 5
Appin (dist.) ..... C 4
Applecross ..... C 3
Arbroath, 19,503 ..... F 4
Ardle (river) ..... E 4
Ardnamurchan (dist.) ..... B 4
Ardnamurchan (point) ..... B 4
Ardrishaig ..... C 5
Argyll (dist.) ..... C 4
Arisaig ..... B 4
Arkaig (lake) ..... C 4
Armadale, 5,803 ..... B 2
Arran (isl.) ..... C 5
Assynt (lake) ..... C 2
Atholl (dist.) ..... E 4
Auchinleck, 4,837 ..... D 5
Auchterarder, 2,434 ..... D 4
Avon (river) ..... E 3
Awe (lake) ..... C 4
Ayr, 43,011 ..... D 5
Badenoch (dist.) ..... D 4
Balfron, 1,107 ..... D 4
Ballater, 1,301 ..... F 3
Banchory, 1,598 ..... F 3
Banff, 3,359 ..... F 3
Bankhead, 3,025 ..... E 5
Bannockburn, 4,759 ..... B 1
Barr ..... D 5
Barra (isl.) ..... A 3
Barra (pass.) ..... A 4
Barra (sound) ..... A 3
Barra Head (prom.) ..... A 4
Barrhead, 12,971 ..... A 2
Bathgate, 11,290 ..... E 5
Beauly, 1,112 ..... D 3
Beith, 4,347 ..... A 2
Ben Alder (mt.) ..... D 4
Ben Dearg (mt.) ..... D 3
Ben Macdhui (mt.) ..... E 3
Ben Mhor (mt.) ..... A 3
Ben More (mt.) ..... D 2
Ben More (mt.) ..... D 4
Ben Nevis (mt.) ..... D 4
Benbecula (isl.) ..... A 3
Bettyhill ..... D 2
Biggar, 1,437 ..... E 5
Birrens ..... E 5
Blair-Atholl ..... E 4
Blairgowrie and Rattray, 5,383 ..... E 4
Bo'ness, 9,949 ..... E 5
Bonhill ..... A 1
Boreray (isl.) ..... A 5
Bowmore ..... B 5
Bracadale ..... B 3
Braemar ..... E 3
Braemar (dist.) ..... E 3
Breadalbane (dist.) ..... D 4
Brechin, 7,264 ..... F 4
Bridge of Allan, 3,173 ..... D 4
Broadford ..... C 3
Brodick, 1,033 ..... C 5
Broom (inlet) ..... D 3
Brora, 1,074 ..... E 2
Buckhaven and Methil, 20,154 ..... F 4
Buckie, 7,705 ..... F 3
Bucksburn, 3,751 ..... F 3
Bunessan ..... B 4
Burghead, 1,367 ..... E 3
Bute (sound) ..... C 5
Butt of Lewis (prom.) ..... B 2
Cairn Gorm (mts.) ..... E 3
Cairnsmore (mt.) ..... D 5
Caledonian (canal) ..... D 3
Callander, 1,727 ..... D 4
Cambuslang, 26,335 ..... B 2
Campbeltown, 7,169 ..... C 5
Canna (isl.) ..... B 3
Carluke, 7,126 ..... C 2
Carn Eige (mt.) ..... C 3
Carnoustie, 5,195 ..... F 4
Carrick (dist.) ..... D 5
Carron (inlet) ..... C 3
Carsphairn ..... D 5
Castle Douglas, 3,322 ..... D 6
Castlebay ..... A 4
Cheviot (hills) ..... F 5
Chirnside ..... F 5
Clisham (mt.) ..... A 3
Clyde (firth) ..... A 2, C 5
Clyde (river) ..... E 5
Clydebank, 44,625 ..... B 2, D 5
Coatbridge, 47,538 ..... E 5
Coire (lake) ..... D 2
Coldingham ..... F 5
Coldstream, 1,294 ..... F 6
Coll (isl.) ..... B 4
Colonsay (isl.) ..... B 4
Comrie, 1,196 ..... D 4
Corsewall (point) ..... C 5
Coupar Angus, 2,175 ..... E 4
Cowall (dist.) ..... C 4
Cowdenbeath, 13,153 ..... E 4
Creag Meagaidh (mt.) ..... D 4
Cree (river) ..... D 5
Crieff, 5,473 ..... E 4
Cromarty, 726 ..... E 3
Cuillin (sound) ..... B 3
Cullen, 1,555 ..... F 3
Cumnock and Holmhead, 4,607 ..... D 5
Cupar, 5,530 ..... E 4
Dalbeattie, 3,288 ..... E 6
Dalkeith, 8,786 ..... F 5
Dalmellington, 4,702 ..... D 5
Dalry, 4,024 ..... A 2, D 5
Darvel, 3,237 ..... D 5
Dee (river) ..... F 3
Denny and Dunipace, 6,692 ..... B 1
Dingwall, 3,367 ..... D 3
Don (river) ..... F 3
Doon (lake) ..... D 5
Dornoch, 793 ..... D 3
Douglas, 2,263 ..... E 5
Doune, 834 ..... D 4
Dufftown, 1,460 ..... E 3
Dumbarton, 23,703 ..... B 1, D 4
Dumfries, 26,320 ..... E 5
Dunbar, 4,115 ..... F 4
Dunblane, 2,982 ..... B 1, E 4
Duncansby Head (prom.) ..... F 2
Dundee, 177,333 ..... E 4
Dunfermline, 44,710 ..... E 4
Dunipace and Denny, 6,692 ..... B 1
Dunkeld ..... E 4
Dunoon, 9,940 ..... A 1, C 5
Duns, 2,028 ..... F 5
Earlston, 1,200 ..... F 5
Eday (isl.) ..... F 1
Edinburgh (cap.), 466,770 ..... E 5
Edzell ..... F 4
Eigg (isl.) ..... B 4
Elgin, 10,535 ..... E 3
Ellon, 1,491 ..... F 3
Embo ..... E 3
Enard (bay) ..... C 2
Ericht (lake) ..... D 4
Etive (inlet) ..... C 4
Ettrick Pen (mt.) ..... E 5
Ewe (inlet) ..... C 3
Eye (pen.) ..... B 2
Eyemouth, 2,269 ..... F 5
Fair (isl.) ..... F 2
Falkirk, 37,528 ..... B 1, E 4
Fannich (lake) ..... C 3
Fetlar (isl.) ..... G 2
Fetteresso ..... F 4
Findochty, 1,490 ..... F 3
Flannan (isls.) ..... A 2
Foinhaven (mt.) ..... D 2
Ford ..... C 4
Forfar, 9,981 ..... F 4
Formantine (dist.) ..... F 3
Forres, 4,462 ..... E 3
Fort Augustus ..... D 3
Fort William, 2,661 ..... C 4
Forth, 3,217 ..... E 5
Forth (firth) ..... F 4
Forth (river) ..... B 1
Forth and Clyde (canal) ..... B 2
Fortrose, 875 ..... D 3
Foula (isl.) ..... F 2
Foyers ..... D 3
Fraserburgh, 10,444 ..... G 3
Fyne (inlet) ..... C 5
Fyne (lake) ..... D 4
Gairloch ..... C 3
Gairloch (dist.) ..... C 3
Galashiels, 12,496 ..... F 5
Gallan Head (prom.) ..... A 2
Galloway (dist.) ..... D 6
Galloway, Mull of (cape) ..... C 6
Galston, 4,560 ..... D 5
Gigha (isl.) ..... C 5
Girvan, 5,990 ..... C 5
Glamis ..... F 4
Glas Maol (mt.) ..... E 4
Glasgow, 1,089,555 ..... B 2, D 5
Glass (river) ..... D 3
Glenelg ..... C 3
Golspie ..... E 3
Gourock, 9,107 ..... A 1
Grampian (mts.) ..... D 4
Grangemouth, 15,305 ..... E 4
Grantown-on-Spey, 1,541 ..... E 3
Greenock, 76,299 ..... A 2, C 5
Gretna Green ..... F 5
Gruinard (dist.) ..... C 3
Gunna (sound) ..... B 4
Haddington, 4,497 ..... F 5
Halkirk ..... E 2
Hamilton, 40,173 ..... B 2, D 5
Harris (dist.) ..... B 3
Harris (sound) ..... A 3
Hawick, 16,718 ..... F 5
Hebrides (isls.), 34,592 ..... A 3
Hebrides (sea) ..... B 3
Helensburgh, 8,760 ..... A 1, D 4
Helmsdale (river) ..... E 2
Herma Ness (prom.) ..... F 2
Hobkirk ..... F 5
Hopeman ..... E 3
Howmore ..... A 3
Hoy (isl.) ..... E 2
Huntly, 4,197 ..... F 3
Innerleithen, 2,361 ..... F 5
Insch ..... F 3
Inveraray, 503 ..... C 4
Inverbervie, 885 ..... F 4
Invergordon, 1,514 ..... D 3
Inverlochy, 1,196 ..... D 4
Inverness, 28,115 ..... D 3
Inverurie, 5,054 ..... F 3
Iona, (isl.) ..... B 4
Irvine, 14,741 ..... D 5
Islay (isl.) ..... B 5
Jedburgh, 4,083 ..... F 5
Johnstone, 15,661 ..... A 2
Jura (isl.) ..... C 5
Keith, 4,365 ..... F 3
Kelso, 4,119 ..... F 5
Kilbrannan (sound) ..... C 5
Kilmarnock, 42,120 ..... D 5
Kilrenny and Anstruther, 2,991 ..... F 4
Kilsyth, 9,915 ..... B 1
Kilwinning, 6,553 ..... D 5
Kingussie, 1,067 ..... D 3
Kinlochbervie ..... C 2
Kinlochleven, 1,742 ..... C 4
Kinloch-Rannoch ..... D 4
Kinross, 2,495 ..... E 4
Kintore, 870 ..... F 3
Kintyre (pen.) ..... C 5
Kirkcaldy, 49,037 ..... E 4
Kirkcudbright, 2,498 ..... E 6
Kirkintilloch, 14,824 ..... B 2
Kirkwall, 4,348 ..... F 2
Kirriemuir, 3,570 ..... F 4
Kyle ..... C 3
Lammermuir (hills) ..... F 5
Lanark, 6,219 ..... C 5
Langholm, 2,403 ..... E 5
Largs, 8,606 ..... A 2, D 5
Larkhall, 14,309 ..... B 2, D 5
Lauder, 623 ..... F 5
Laurencekirk, 1,485 ..... F 4
Leadhills ..... E 5
Leith ..... E 5
Lennox (hills) ..... B 1
Lerwick, 5,538 ..... G 2
Leslie, 2,612 ..... E 4
Leven, 8,868 ..... F 4
Lewis (isl.) ..... B 2
Liddel Water (river) ..... F 5
Linlithgow, 3,929 ..... E 5
Linnhe (inlet) ..... C 4
Little Minch (strait) ..... B 3
Loanhead, 4,886 ..... E 5
Loch (dist.) ..... C 3
Lochalsh (dist.) ..... C 3
Lochbroom ..... D 3
Lochgilphead, 1,229 ..... C 4
Lochinver ..... C 2
Lochmaben, 1,127 ..... E 5
Lochnager (mt.) ..... E 4
Lochy (lake) ..... D 4
Lockerbie, 2,623 ..... E 5
Lomond (lake) ..... A 1, D 4
Long (inlet) ..... A 1
Lorne (dist.) ..... C 4
Lorne (firth) ..... B 4
Lossiemouth, 5,596 ..... E 3
Loyal (lake) ..... D 2
Luce (bay) ..... D 6
Macduff, 3,322 ..... F 3
Mainland (isl.) ..... F 2
Mar (dist.) ..... F 3
Maree (lake) ..... C 3
May (isl.) ..... F 4
Maybole, 4,766 ..... D 5
Melrose, 2,146 ..... F 5
Mhor (lake) ..... D 3
Millport, 2,012 ..... A 2, C 5
Moffat, 2,114 ..... E 5
Moidart (dist.) ..... C 4
Monadliath (mts.) ..... D 3
Monar (lake) ..... C 3
Monifieth, 3,417 ..... F 4
Montrose, 10,760 ..... F 4
Morar (lake) ..... C 4
Moray (firth) ..... E 3
More (lake) ..... D 2
Morven (dist.) ..... C 4
Morven (mt.) ..... E 2
Motherwell and Wishaw, 68,137 ..... B 2, E 5
Muck (isl.) ..... B 4
Muirkirk ..... E 5
Mull (isl.) ..... C 4
Mull of Oa (cape) ..... B 5
Mull of Galloway (cape) ..... C 6
Mull of Kintyre (cape) ..... C 5
Musselburgh, 17,012 ..... F 5
Nairn, 4,700 ..... E 3
Nairn (river) ..... D 3
nan Clàr (lake) ..... E 2
Naver (lake) ..... D 2
Ness (lake) ..... D 3
Nevis (inlet) ..... C 3
New Cumnock, 3,871 ..... D 5
New Galloway, 305 ..... D 5
New Pitsligo, 1,438 ..... F 3
Newburgh, 2,367 ..... E 4
Newport, 3,273 ..... E 4
Newton-Stewart, 2,000 ..... D 6
Nith (river) ..... E 5
North (channel) ..... C 5
North Berwick, 4,001 ..... F 4
North Minch (strait) ..... B 2
North Ronaldsay (isl.) ..... F 1
North Uist (isl.) ..... A 3
Oa, Mull of (cape) ..... C 5
Oban, 6,227 ..... C 4
Oich (river) ..... D 3
Old Deer ..... F 3
Old Meldrum, 1,104 ..... F 3
Orkney (isls.), 21,258 ..... E 1
Oronsay (pass.) ..... B 4
Oykell (river) ..... D 3
Oykell Bridge ..... D 2
Paisley, 93,704 ..... A 2, D 5
Papa Westray (isl.) ..... F 1
Peebles, 6,013 ..... E 5
Penicuik ..... E 5
Pentland (firth) ..... E 2
Perth, 40,466 ..... E 4
Peterhead, 12,765 ..... G 3
Pitlochry, 2,384 ..... E 4
Pomona (isl.) ..... E 1
Port Askaig ..... B 5
Port Ellen ..... B 5
Port Glasgow, 31,612 ..... D 5
Port of Ness ..... B 2
Portpatrick ..... C 6
Portree ..... B 3
Portsoy, 1,787 ..... F 3
Prestwick, 11,386 ..... D 5
Quoich (lake) ..... C 3
Raasay (isl.) ..... B 3
Rannoch (dist.) ..... D 4
Reay ..... E 2
Renfrew, 17,093 ..... A 2
Rona (isl.) ..... A 4
Rosehearty, 1,173 ..... F 3
Rothes, 1,211 ..... E 3
Rothesay, 10,145 ..... C 5
Rousay (isl.) ..... E 1
Rum (isl.) ..... B 4
Rutherglen, 24,225 ..... D 5
Saint Andrews, 9,459 ..... F 4
Saint Kilda (isl.) ..... A 5
Salen ..... C 4
Saltcoats, 13,108 ..... D 5
Sanday (isl.) ..... F 1
Sanquhar, 2,381 ..... E 5
Scapa Flow (channel) ..... E 2
Scarinish ..... B 4
Scone, 2,292 ..... E 4
Scourie ..... C 2
Scrabster ..... E 2
Seaforth (inlet) ..... B 3
Selkirk, 5,853 ..... F 5
Sgurr Alasdair (mt.) ..... B 3
Sgurr Mhor (mt.) ..... D 3
Shapinsay (isl.) ..... F 1
Shetland (isls.), 19,343 ..... F 2
Shiel (lake) ..... C 4
Shin (lake) ..... D 2
Sidlaw (hills) ..... E 4
Sinclair's (bay) ..... E 2
Skye (isl.) ..... B 3
Sleat (dist.) ..... C 3
Sleat (sound) ..... C 3
Snizort (inlet) ..... B 3
Solway (firth) ..... E 6
South Esk (river) ..... E 4
South Ronaldsay (isl.) ..... F 2
South Uist (isl.) ..... A 3
Spey (river) ..... E 3
Stirling, 26,960 ..... B 1
Stonehaven, 4,438 ..... F 4
Stornoway, 4,954 ..... B 2
Stranraer, 8,622 ..... C 6
Strathmore (dist.) ..... E 4
Strathpeffer ..... D 3
Strathy (point) ..... D 2
Stromness, 1,503 ..... E 2
Stronsay (isl.) ..... F 1
Sulisker (isl.) ..... A 4
Sumburgh Head (prom.) ..... G 2
Sunart (inlet) ..... C 4
Tain, 1,602 ..... D 3
Tarbert ..... B 3
Tarbert, 1,426 ..... C 5
Tay (firth) ..... F 4
Tay (lake) ..... D 4
Tayport, 3,222 ..... F 4
Teviot (river) ..... F 5
Thornhill, 1,262 ..... E 5
Thurso, 3,203 ..... E 2
Tiree (isl.) ..... A 4
Tobermory, 692 ..... B 4
Tolsta Head (prom.) ..... B 2
Ton Mohr (point) ..... B 5
Torridon ..... C 3
Troon, 10,061 ..... D 5
Turriff, 2,994 ..... F 3
Tweed (river) ..... E 5
Uig ..... B 3
Unst (isl.) ..... G 2
Vatersay (isl.) ..... A 4
Watten (lake) ..... E 2
West Linton ..... E 5
Westray (isl.), 1,091 ..... E 1
Whithorn, 1,068 ..... D 6
Wick, 7,161 ..... F 2
Wigtown, 1,376 ..... D 6
Wishaw and Motherwell, 68,137 ..... B 2
Wrath (cape) ..... C 2
Yell (isl.) ..... F 2

ning of the 6th century, when a colony of Scots or Dalriads from Ireland effected a settlement in Argyll, and gradually spread over the adjacent regions. It is from these Scots (a Celtic and Gaelic-speaking people) that the country afterward received the name of Scotland, the original Scotland (Scotia) being Ireland. The Pictish tribes were divided into two great sections, the Piccardach or Southern Picts, and the Cruithne or Northern Picts. In the 9th century the Dalriadic Scots with the help of the Cruithne conquered the Southern Picts, but the Northern Picts, the ancestors of the modern Highlanders, still retained their independence. The Teutonic element was introduced into Scotland as early as the 4th century, when bands from North Germany seem to have formed settlements on the east coast south of the Firth of Forth; and this part of the country was subsequently united to the Anglian kingdom of Northumbria, which extended from the Forth to the Humber. To the west of this kingdom, from Dumbarton to the Solway and into England, extended the kingdom of Strathclyde or Cumbria, inhabited by Romanized Britons.

About the middle of the 9th century Kenneth MacAlpin, son of a ruler of a body of Scots established in Galloway, but of Pictish descent through his mother, united in his own person the sovereignty of both the Picts and the Scots. The Norsemen had already established a footing on the islands of the north and west coasts as far south as the Isle of Man, and a Norse earldom of Orkney was established. Kenneth's kingdom comprised Central Scotland (Argyle, Perth, Angus, Mearns and Fife), with Scone as capital, the north of Scotland being mostly under independent chiefs, or mormaors. The reigns of Kenneth and his immediate successors, Donald I, Constantine I, Grig, Donald II, Constantine II, Malcolm I, Kenneth II, Malcolm II, Duncan, and Macbeth, were one continued warfare with the Norsemen on one hand and with the Britons of Strathclyde and the English of Northumbria on the other. Malcolm I (943–954) obtained Cumbria (Strathclyde) as a territorial fief from Edmund I, and in 1018 his grandson, Edmund II, secured Lothian, hitherto part of Northumbria, two events which materially influenced the after history of Scotland.

On the advent of Malcolm Canmore (1058) to the throne after the death of Macbeth, the able usurper and murderer of Duncan (see MACBETH), the purely Celtic monarchy came to an end.

The conquest of England by William of Normandy, the usurpation of the English throne by Stephen, and various other incidents of English history embroiled Scotland. Sir William Wallace (q.v.) distinguished himself in disputing the claim of Edward I to the throne of Scotland and Robert Bruce securing the independence of the country and his title to the throne by the decisive battle of Bannockburn in 1314. He was succeeded by his nephew, Robert Stewart, and he by his eldest son, Robert. He being a weak prince, the reins of government were seized by the duke of Albany, who starved to death the eldest son of the king. James, the second son, to escape a similar fate, fled to France; in the year 1424 he returned to Scotland, and having excited the jealousy of the nobility, he was assassinated in a monastery near Perth. James II, his son, an infant prince, succeeded him in 1437. He was killed by the bursting of a cannon at the siege of the castle of Roxburgh. James III ascended the throne at the age of seven years. His reign was weak and inglorious, and he was murdered in the house of a miller, whither he had fled for protection. James IV, a generous and brave prince, began his reign in 1488. He was slain at the battle of Flodden. James V, an infant of less than two years of age, succeeded to the Crown. He died in 1542, and was succeeded by his daughter, the celebrated Queen Mary, whose history and tragical end are well known (see MARY STUART). She was succeeded by her son James, who, in 1603, ascended the throne of England, vacant by the death of Queen Elizabeth, when the two kingdoms were united into one great monarchy which was legislatively united in 1707. A joint commission was appointed to draw up articles of union in 1706. The Scottish Parliament met to consider the articles, which encountered a strong opposition headed by the duke of Hamilton, and strongly backed up by the bulk of the people. A majority of the Parliament, however, carried the measure, 16 Jan. 1707; it received the royal assent 4 March; and the Union took effect 1 May. The chief provisions of the Act of Union were (1) that the two kingdoms should be united under the name of "Great Britain"; (2) that the succession to the crown of the United Kingdom should be the Electress Sophia of Hanover and her heirs, being Protestants; (3) that 16 Scottish peers and 45 Scottish members of the House of Commons should be elected to the one Parliament sitting in London; (4) that the Established Presbyterian Church of Scotland should be maintained; (5) that Scotland should keep unchanged her own laws and customs relating to property and private rights, and also the Court of Session and other Scottish courts; (6) that all the rights of trade, free intercourse and citizenship should be the same for Scottish and English subjects. Henceforth the general history of Scotland may be said to be almost entirely identified with that of England.

For further information see the series of articles under GREAT BRITAIN. Statistical data will be found in the AMERICANA ANNUAL.

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SCOTTISH LANGUAGE AND LITERATURE

Language.—The history of the language spoken in the country we now call Scotland does not coincide with the development of any single "Scottish" language. It took a long time for the Gaelic and non-Gaelic elements to combine to form a single Scottish nation, and until this development took place—it almost took place in the 15th century, but a succession of unfortunate events postponed it until the 18th—there were at least two languages existing side by side, each with a claim to be the true language of Scotland.

The original "Scots," who came from Ireland to the west of Scotland about the end of the 5th century, gave their name to the kingdom of Scotia, which, in the 9th century, absorbed the earlier kingdom of Pictavia, with the result that the Picts soon adopted the Gaelic language of the Scots. Thus the inhabitants of the north and west of Scotland were speaking a common Gaelic tongue by the 11th century, if not earlier. During the succeeding centuries, the non-Gaelic speech of Lowland Scotland pushed north and west, until today Gaelic is spoken only by a small fraction of the Scottish people. In 1931, those who spoke only Gaelic numbered 7,069, while 130,080 persons spoke both Gaelic and English.

The language and literature of the Gaelic Scot remained closely associated with Irish culture until the emergence of a more purely Scottish Gaelic literature after the Reformation severed the ties with Ireland. The new native Gaelic tradition came to its climax with the 18th century Scottish Gaelic poets, but the rapid decline of Gaelic as a spoken language in Scotland (a decline hastened by the unhappy fate of the Highlands after the defeat of the Jacobite Rebellion in 1746) drastically restricted the audience for such poetry and helped to produce in the minds of both Englishmen and Scotsmen the impression that Scottish literature was identical with the non-Gaelic literature of Lowland Scotland. It is that non-Gaelic literature to which, for reasons of space, the present discussion is confined. (See also CELTIC LANGUAGES, CELTIC LITERATURE, CELTIC RENAISSANCE, GAELIC LITERATURE, and SCOTTISH GAELIC LITERATURE.)

Lowland Scots is a northern form of English, and is directly descended from the old Anglian speech. The northern English dialect originally spread into Scotland from Northumbria, steadily ousting the various Celtic dialects (the Gaelic of the Scots and the Brythonic Celtic of much of the Lowlands and the southwest) as it pushed northward. In the east, where there were no mountain barriers, the Anglian speech pushed far north, up to Aberdeen and beyond to the Moray Firth. It was this original Anglian speech that developed into the distinctively "Scots" form of the English language which has been known in modern times simply as "Scots."

Such literature as existed in the Old Anglian speech has hardly survived the Danish destruction of the Northumbrian monasteries and other repositories of manuscripts. However, a few fragments remain, and these make clear that in its early phases the language of Lowland Scotland was (at least in its literary form) substantially identical with that of northern England. The fragment of the *Dream of the Rood* carved in runes on the Ruthwell Cross in southwest Scotland, dating probably from the 9th century, is in a language that might have been written equally in the Lothians or in Yorkshire, while John Barbour's *Brus,* written in Aberdeen in the late 14th century, is, so far as linguistic criteria are concerned, hardly distinguishable from contemporary work produced anywhere in England north of the Humber.

Early Scots is thus identical with the language spoken and written in northern England as far down as the Humber, and linguistically its history is that of the Northumbrian dialect of Old and early Middle English. However, the stabilization of the Scottish border, and the growing sense of separation from England which the Wars of Independence in the late 13th and early 14th century produced, helped to keep the language of Scotland away from the influences which were leading to the standardization of literary English as the South East Midland dialect. As a result, the English spoken and written in Scotland retained its northern characteristics long after such characteristics had disappeared from the written language of northern England. The growing sense of nationality produced by the Wars of Independence and later by the rule of the early Stuarts (Stewarts) encouraged Lowland Scotland to consider itself culturally Scottish rather than English, and by the middle of the 15th century, at which time the South East Midland dialect had become more or less standard in England, it is justifiable to talk of "Scots" as a separate, purely Scottish, form of literary English. Gaelic, Norse, French, and direct Latin influences and importations further helped to differentiate Scots.

It was not until the 16th century that we find the term "Scots" used in its modern sense, i.e., to denote the language of non-Gaelic Scotland. Until that time, we find "Scottis" used to designate the speech of the Gaelic-speaking Scots to

the north and west, and "Inglis" used for the language of Lowland Scots. The modern use of "English" to denote standard English, "Scots" to denote the northern form of English which became distinctively Scottish by the middle of the 15th century, and "Gaelic" (in the 16th century called "Ersch" or "Yrische") for the Celtic language of the north and west, is a development which began in the course of the 16th century.

The political history of Scotland after 1603 is largely responsible for the fact that Scots, in the modern sense of the term, gave way to English as the literary language of the Scottish nation. The Reformation deprived Scotland of her traditional French alliance and brought her into close cultural contact with England. John Knox's *History of the Reformation* (published in 1584), a work whose language shows a strong Southern influence, is an interesting sign of the times. The fact that Presbyterian Scotland used an English and not a Scots version of the Bible was one of the decisive factors, and the far-reaching consequences of the union of the crowns in 1603, which brought the Scottish court to London, and the union of parliaments in 1707, are not easily overestimated. The great revival of literary Lowland Scots in the 18th century, culminating in the work of Robert Burns, began as an antiquarian compensation for political defeat, and ended in a magnificent flowering of Scottish poetry, which, nevertheless, came too late to change the course of historical developments. Modern attempts to revive Scots as a literary language, and to emancipate it from the sentimental exhibitionism to which it was confined in the middle and later 19th century, have been made by several crusading writers, notably Hugh MacDiarmid (Christopher Murray Grieve), but so far these efforts have not been effective on a really national scale.

Literature.—There is little surviving material for a history of non-Gaelic Scottish literature dating from before the 14th century. The earliest extant piece of Scottish poetry is an anonymous stanza, preserved in Andrew of Wyntoun's *Oryginale Cronykil* (c.1420), lamenting the death of King Alexander III (1286). The names of many popular songs which may well date from before 1300 are preserved in later works, and suggest the existence of a lively song tradition, which, like so much Scottish literature, did not survive the Middle Ages. The name of Thomas of Erceldoune, called Thomas the Rhymer (q.v.), who must have lived in the latter half of the 13th century, has survived in a legendary fashion, but none of his works remain. We do know, however, that he contributed to the Arthurian cycle. Scotland's contribution to medieval romance seems to have been much greater than the number of surviving works would indicate. The mysterious Hucheone (Huchoun) of the Awle Ryale (fl. 14th century), whose true identity has long been a matter of dispute, has been identified by some with the author of *Sir Gawaine and the Green Knight*—one of the most individual of Arthurian romances—and of the remarkable allegorical lament, *The Pearl* (both c.1370, qq.v.). Hucheone, if he really was the author of all the works that have been at one time or another attributed to him, was not only the greatest Scots poet of his century, but one of the greatest poets in medieval Britain.

A clearer figure is Hucheone's contemporary, John Barbour (1316?–1395, q.v.), archdeacon of Aberdeen, whose *Brus* (completed in 1375) is versified history of a very high order. It is an account of the campaigns of the Scottish patriot king, Robert the Bruce, whose great victory over the English Army at Bannockburn in 1314 marked the victorious end of the Scottish Wars of Independence. Barbour was in touch with people who had known Bruce, and his poem is in large measure genuine history. The narrative, in octosyllabic couplets, is vigorous and lively. The *Oryginale Cronykil of Scotland,* written early in the 15th century by Andrew of Wyntoun (1350?–?1420, q.v.), is another Scottish verse history, more conventional in tone and more ambitious in scope than the *Brus.* Like most medieval histories, it starts with the creation, but it is an important source when dealing with periods of history close to the author's own time.

Later in the 15th century the writer known to tradition as Blind Harry (Henry the Minstrel, fl. 1470–1492) produced his *Actis and Deidis of the Illustere and Vailzeand Campioun Schir William Wallace,* a free, romantic version of the life of the great Scottish patriot who preceded Bruce in the long struggle against Edward I of England and his son. A facile and rather flamboyant poetic narrative, written for the most part in heroic couplets (though there are lyrical interludes in other metres), it appeals more forcefully to the Scottish popular imagination than the more sober work of Barbour, and long remained popular. It is full of graphic and picturesque scenes, and what it lacks in historical accuracy it certainly makes up in vividness. An early 18th century "modernisation" (1722) by Hamilton of Gilbertfield was widely read for many years.

The Scottish Chaucerians.—Blind Harry's *Wallace* seems to have been influenced in some degree by the great English poet, Geoffrey Chaucer (1340?–1400, q.v.), whose fame spread rapidly throughout Lowland Scotland and whose influence in 15th and 16th century Scottish poetry is indicated by the title "Scottish Chaucerians," long used for those poets whose work constitutes the fine flower of Scottish medieval literature. This title is perhaps somewhat misleading, for these writers are by no means mere imitators, and have many wholly original qualities. William Dunbar, for example, shows qualities of mind and types of skill far removed from anything in Chaucer or his English imitators. But the title is justified in some degree, as Chaucer's work was undoubtedly a major influence and source of inspiration in Scotland for over a century after his death.

James I.—The Kingis Quair (1423), generally ascribed to King James I of Scotland (1394–1437, q.v.), opens what is perhaps the greatest century in Scottish literary history. This work is a remarkable narrative poem in the love-allegory convention, but with a delicacy of expression and a tenderness of personal feeling which distinguish it from other examples of this form. Written in Chaucer's 7-line stanza, in a Scots considerably modified by Chaucer's English, *The Kingis Quair* is the record of James's love for and courtship of Lady Jane Beaufort, whom he met during his long imprisonment in England and eventually married.

Henryson.—With Robert Henryson (1430?–?1506), we come to the first Scottish poet to approach Chaucer in sustained achievement.

Henryson's chief work, *The Testament of Cresseid* (a sequel to Chaucer's *Troilus and Criseyde*), is a brilliant narrative poem done with a quiet wisdom, a realistic precision of imagery, and a genuine sense of the dramatic, which make it one of the masterpieces of Scottish literature. Henryson was the first medieval narrative poet to emancipate himself completely from the Italianate imagery which dominates even the landscapes of Chaucer. His intimate and vivid images drawn from contemporary Scottish life, and in particular his strong sense of contrast between a warm domestic interior and the chill landscape of a Scottish winter, founded a tradition in Scottish writing that was revived by Burns and exists even to the present day. Similar qualities are shown in his *Morall Fabilles of Esope,* in which the classical tales are given a strong Scottish flavor, with much local color and quiet humor. *Robene and Makyne,* a terse pastoral *débat* done with epigrammatic force, is a perfect thing of its kind; *Orpheus and Eurydice,* a retelling of the classical story whose conventionality of manner is relieved by the brilliant lyrical "complaint" in the midst of the poem; and *The Bludy Serk,* a brief but powerful allegorical tale—add further to the stature of this shrewd, humorous and gentle poet.

Dunbar.—The third of the so-called "Scottish Chaucerians," and probably the greatest, is William Dunbar (1460?–?1520, q.v.), whose versatility and technical virtuosity represent something unprecedented in Scottish poetry. A poet of the court of James IV, during whose reign Scottish civilization attained a short-lived, feverish brilliance which is reflected in Dunbar's poetry, he produced work in almost every known medieval tradition, and also wrote numerous personal and "occasional" poems unlike anything else in the Middle Ages. In *The Thrissil and the Rois* (1503), he gave an allegorical account of the marriage of James IV and Margaret Tudor which is remarkable for sustained richness of imagery, metrical virtuosity, and vivid descriptive power. More individual are his realistic and humorous pictures of court life, presented with tremendous verve and gusto. His descriptions of Edinburgh town life, with their impressive gray-and-silver imagery and metrical diversity, are equally notable; while his religious poems, with their resounding Latinized vocabulary ("aureation") reflect the spirit of medieval Edinburgh. He could be religious, comic, obscene, autobiographical, descriptive, and strictly conventional by turns, and occasionally he let himself go (as in *The Dance of the Sevin Deidly Synnis,* written between 1503 and 1508) with a furious serio-comic abandon which takes the reader by storm. *The Tua Mariit Wemen and the Wedo,* written in the old alliterative convention, is a dialogue done with vivid ironical humor, reminiscent of much 20th century satire in its unsparing exposures, and at the same time essentially comic. This is the longest of Dunbar's poems, which are usually short and in stanza form. In touch with all the literary conventions of medieval Europe, Dunbar was at the same time an autobiographer, a realist, and a true disciple of those wandering scholars of an earlier age who founded the goliardic tradition which, except for Dunbar, hardly survived after the 15th century save in oral and popular forms. Finally, Dunbar was a technical virtuoso and a poetic craftsman of remarkable quality.

Also belonging to the 15th century are the lively romance *Raif Coilyear* (a Charlemagne romance in a Scottish setting by an anonymous author of the third quarter of the 15th century); and two remarkable poetic accounts of rustic revelry, *Peeblis to the Play* and *Christ's Kirk on the Green,* both rollicking descriptions of popular merrymaking, written in a distinctive stanza form which has been much imitated in later Scottish literature. These two poems, combining the folk and the "art" tradition in Scottish song, were often reprinted in the 18th century and greatly influenced the work of both Fergusson and Burns.

Douglas.—The last major poet in the "Scottish Chaucerian" tradition is Gawin Douglas (1474?–1522, q.v.), whose allegorical poems, *The Pallice of Honour,* and *King Hart,* are the most complete examples in Scottish literature of the medieval allegory. They are labored, artificial, and very consciously traditional both in form and subject matter, and do not bear too easily their load of Christian and classical learning. These poems often reach a high level of sonorous eloquence, but they lack the vitality of Dunbar, even at his most aureate. Douglas' greatest achievement is his translation of the *Aeneid,* the first verse translation of that poem in Britain. It is done in couplets with sustained vigor and a noteworthy clarity of imagery, but the poetry is hardly Virgilian in style or timbre. The most remarkable parts of the work are the prologues to the individual books, in which Douglas gives descriptions of the Scottish countryside infused with a personal emotion in a manner unprecedented in English or Scottish literature at that time.

16th and 17th Centuries.—With Sir David Lindsay, or Lyndsay (1490?–?1555) we come to a real break with the medieval tradition, in spite of his allegorical poem *The Dreme* (1528), with its medieval properties, and many other medieval echoes throughout his work. Lindsay was primarily a satirist who castigated the evils of his time with a coarse vigor. In *The Testament and Complaynt of our Soverane Lordes Papyngo* (1530), he satirizes the abuses in the church and at court with an almost personal bitterness. His *Satyre of the Thrie Estaitis* (1540, the only extant Scottish morality play) is of considerable historical interest, as it approximates to the form of the modern drama more closely than anything that had yet been written in England. An adaption of the morality play for purposes of political, social and ecclesiastical satire, it is written in a variety of metres, with great spirit and considerable humor, though at inordinate length. *The Historie of Squyer Meldrum,* in fast-moving octosyllabic couplets, is a picaresque narrative, with sufficient lively passages to hold the reader's interest, but lacking in any profounder qualities. *The Monarchie* (1554), Lindsay's longest work, is a rather dull dialogue between Experience and a Courtier concerning the state of the world, together with a history of man from the creation to the judgment day. Lindsay is a traditional poet, perhaps more important historically than intrinsically.

Sir Richard Maitland of Lethington (1496–1586), is more impressive as a collector of older Scottish poetry than as a poet in his own right, though his original work is both dexterous and varied.

The Reformation in Scotland destroyed many

traces of earlier literature, and in addition brought about social and political conditions under which the development of the native Lowland Scots literary tradition became, for the time being at least, impossible. Thus at the time when Lowland Scots literature promised most—after the molding of a Scottish literary tongue by the great poets of the 15th and early 16th centuries—it was wiped out almost entirely. The accomplished love lyrics of Alexander Scott (1525?–?1584), and the poems of the more versatile though less brilliant, Alexander Montgomerie (1556?–?1610), represent a temporary revival which has been attributed to the influence of the Pléiade in France. Montgomerie's *The Cherry and the Slae* (1597), and *The Bankis of Helicon,* are curious allegorical poems in an interesting 14-line stanza which was later imitated by Burns. By this time, the new experimentation in English verse forms that had already manifested itself in England in such works as *Tottel's Miscellany* (1557) was spreading to Scotland, though the state of the country did not allow the literary Renaissance which it produced in England to develop in the north. And Scottish drama, which began so promisingly, was completely suppressed.

Among the minor writers of this period must be mentioned Mark Alexander Boyd (1563–1601), who wrote excellent Latin verse and one brilliant sonnet in Scots, and Alexander Hume (1557?–1609), whose *Hvmnes or Sacred Songs* (1599) are less interesting than his admirable long poem descriptive of a summer's day from dawn to dusk, *Of the Day Estivall.* Sir Robert Sempill (or Semple) of Beltrees (1595?–?1668) remains famous for his single masterpiece, *The Life and Death of the Piper of Kilbarchan* (otherwise known as the *Epitaph on Habbie Simson*), which was the model for innumerable later Scottish poems in the same style and meter, including several by Ramsay, Fergusson and Burns. The stanza, used in Burns' *To a Mouse* and other poems, was already accepted in the early 18th century as peculiarly suited to Lowland Scots poetry.

An interesting sign of the times is the *Gude and Godlie Ballatis* (the first known edition of which belongs to 1567, although there were probably earlier editions), a product of the Scottish Reformation. This collection of Protestant verses is divided into four sections: a catechism of doctrine, in prose and verse; 16 *Spiritual Sangis; Certaine Ballatis of the Scripture;* and *The Psalmes of David, with uther new Pleasand Ballatis.* The final section is the most interesting, and includes a great variety of verse, from genuine religious poetry and scriptural paraphrases to parodies of popular songs in which a religious meaning is introduced. This collection, probably the work of James (q.v.), John, and Robert Wedderburn, was very popular in the late 16th and early 17th centuries, but after the victory of Calvinist doctrine over other forms of Protestant theology, in the 17th century, the book (whose doctrine was strongly Lutheran) soon lost favor.

During the period of turmoil and confusion which reigned in Scotland in the latter part of the 16th and during much of the 17th century, any literary tradition is difficult to trace, and all one can do is pick out names here and there. On the whole, the 17th century was a sterile one as far as literature is concerned, except for folk poetry, which flourished beneath the surface and became all the richer, as it was almost the sole literary expression of the nation at this time. Scottish folk songs do not survive in any great number from before the latter part of the 16th century, but from this period and throughout the following century the surviving specimens are numerous and varied, and often of the highest quality. And then there are the ballads (q.v.), so much more numerous and remarkable in Scotland than in England.

Medieval Scottish prose is largely written in Latin. The 16th century produced some excellent translations and also the outstanding early prose work in Scots, *The Complaynt of Scotland* (1549), largely an adaptation of *Le Quadrilogue Invectif* (1422), by the French writer, Alain Chartier. The language of this anonymous work is a highly ornate Scots; and the subject is an allegorical presentation of the case against an English alliance and for the traditional ties with France. Inserted in the poem is a *Monolog Recreative,* which contains a most interesting list of popular songs, stories, and dances, the majority of which are not extant, thus providing an important source for Scottish literary history. The Reformation brought endless works of literary controversy, which can hardly be classed as literature. The *Historie of the Reformation in Scotland,* begun in 1559 by John Knox (1505–1572, q.v.), is a work whose chief literary significance lies in the encroachment of English forms on its Scottish diction.

The union of the crowns in 1603 hastened the decay of the Scottish literary language. William Drummond of Hawthornden (1585–1649, q.v.) wrote in the standard literary English of his day, with an eye on the Italians and the Elizabethans. He is on the fringe of the Elizabethan English tradition rather than at the center of a Scottish one. Gradually Lowland Scotland developed a split personality—thinking and talking in Scots, and writing in English—which was unified only in individual cases and in exceptional circumstances. The Scots speech itself began to break up into a series of dialects (q.v.) thus becoming less suitable as the language of a great literature. With the union of the parliaments in 1707, it looked as though the complete Anglicization of Scottish culture was inevitable.

18th Century Revival.—But this did not take place. After the political union with England, Lowland Scotland began to rediscover its nationality, and the immediate result was the development of a native antiquarian movement whose first important manifestation had already occurred the year before the union, in 1706, when James Watson (d.1722) of Edinburgh published the first volume of *A Choice Collection of Comic and Serious Scots Poems both Ancient and Modern.* This was a deliberate attempt to revive interest in what Watson called "our own native Scots dialect" and the poetry that had been written in it. The collection represented a turning back to the roots of Scottish culture, to the period when Scottish literature was still both Scottish and literature, and to the folk tradition which alone was able to survive the 17th century. Watson thus began a movement for collecting and reprinting older Scottish literature—both folk literature and "art" literature—which in turn produced both a creative and an antiquarian movement in Scotland.

Ramsay.—Allan Ramsay (1686–1758, q.v.), whose activities as bookseller, antiquarian, poet,

and patron of the drama achieved much for Scottish literature, was largely instrumental in bringing social and literary life closer together, and is thus indirectly responsible for that host of clubs, societies, literary associations and similar organizations which made later 18th century Edinburgh so distinguished for its unique combination of literature, conversation and drink. Ramsay's *Tea-Table Miscellany* (first volume, 1724) was a mixed collection of old and new songs and ballads by authors living and dead, and included many hitherto unprinted specimens of Scottish folk literature.

Fergusson.—The revived Scots tradition was carried to new heights by Robert Fergusson (1750–1774, q.v.), whose brief career produced a group of brilliant Scots poems unsurpassed even by Burns for their liveliness, humor and vivid pictorial quality. Fergusson was in touch both with the medieval Scottish tradition, and with the folk tradition that survived longer, and also—very actively—with contemporary "low life," and with student traditions which preserved the old goliardic moods.

Burns.—Robert Burns (1759–1796, q.v.), the Ayrshire farmer whose work was more than touched by the sentimental views of the Scottish novelist, Henry Mackenzie (1745–1831, q.v.), managed however to maintain and progressively strengthen his contact with the local folk traditions, as well as with the older literary traditions of Scotland, and was thus able to throw off the corrupting influences of a sentimentalism and artificiality which welcomed him as a "heaven-taught plowman." His work, with its sources deep in native folk song, was at the same time strongly influenced by the antiquarian movement which made available the texts of much older Scottish poetry, both popular and literary. Burns thus represents the fine flower of the tradition begun by Watson and Ramsay and other late 17th and 18th century writers and collectors of Scottish songs.

19th and 20th Centuries.—Not that Scottish literature disappeared with Burns. Even in the 18th century, there had developed a strong Scottish culture expressing itself in English—the names of the historians, philosophers, and critics of 18th century Edinburgh alone make one of the most impressive lists in the history of any civilization—and there persisted throughout the 19th century a tradition of Scottish writing (though not writing in Scots) which enables us to single out, for example, Thomas Carlyle (1795–1881, q.v.), as a Scottish rather than an English writer.

The Scots language, breaking up into a series of dialects, became confined either to incidental dialogue in fiction (as in the novels of Sir Walter Scott and John Galt), or to a kind of poetry so limited in scope (for a dialect cannot fully bear the burden of a national language) that it easily founded a corrupt and sentimental tradition, dealing with stock properties and emotions. The collection of Scots verse published in 1846 under the title of *Whistle Binkie; a Collection of Songs for the Social Circle* illustrates the depths to which vernacular Scots poetry had sunk by the middle of the 19th century.

In fiction the record was better. Sir Walter Scott (1771–1832, q.v.), concerning himself with the fate of Scotland as it had been determined by history, produced a series of novels of which those dealing with Scottish themes are, for all their conventional plots, profound reflections of the tragi-comic implications of Scottish history and character. Other Scottish novelists played variations on the tradition founded by Scott. They include John Galt (1779–1839, q.v.), with his careful studies of Scottish manners; Robert Louis Stevenson (1850–1894, q.v.), with his characteristic interest in adventure and its relation to topography; Neil Munro (1864–1930, q.v.), with his vivid sense of Scottish history; and John Buchan, Lord Tweedsmuir (1875–1940, q.v.), with his feeling for the Scottish countryside.

The provincialism and sentimentality of so much Scottish writing in the 19th century—typified by *Whistle Binkie* and the writers of the "kailyard" school—finally provoked a reaction. After Sir James Matthew Barrie (1860–1937, q.v.) had said the last word for the kailyard—with a skill and grace which atoned for much, but left unmitigated the fundamental falseness of the picture—George Douglas Brown (1869–1902) exploded the tradition once and for all with his startling debunking novel of Scottish village life, *The House with the Green Shutters* (1901).

In the field of fiction, *Morning Tide,* by Niel M. Gunn (1891–), brought a new sensibility to bear on the Scottish scene, while the trilogy, *A Scots Quair,* by Lewis Grassic Gibbon (pseudonym of James Leslie Mitchell, 1901–1935), pointed to a new and more profound use of Scots dialect in fiction, whose great promise the author unfortunately did not live long enough to fulfill. His work, however, like that of Hugh MacDiarmid, will long remain germinal, stimulating and challenging Scotland to produce once again a literature that is both Scottish and European.

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DAVID DAICHES,
Author of "Poetry and the Modern World."

SCOTLAND, Church of. See DISCIPLINE, BOOKS OF; PRESBYTERIANISM.

SCOTT, Cyril Meir, English composer, pianist and writer: b. Birkenhead, Sept. 27, 1879. He studied under Hoch at Frankfurt and composition under Knorr. In 1899 his first symphony was produced at Darmstadt. On his re-

turn to England an orchestra suite by him was performed at Liverpool. In the years following he wrote a large number of songs, and violin and pianoforte music, all of high merit. Among his most notable works are the *Ballad of Fair Helen; La Belle Dame sans Merci; Helen of Kirkconnel* and *Nativity Hymn.* He wrote, also, two symphonies, two rhapsodies, and an opera. He wrote much on occult philosophy and its application to music, and on the relation of tone and colors. He also published several books of poems and made lecture tours.

SCOTT, David, Scottish painter: b. Edinburgh, Oct. 10, 1806; d. there, March 5, 1859. In 1827 he formed an association with some artists, who founded the Life Academy for the study of the living model. The following year he exhibited his first picture, *The Hopes of Early Genius Dispelled by Death.* In 1841 he exhibited what has generally been considered his greatest picture, *Vasco de Gama Encountering the Spirit of the Storm at the Cape,* which was subsequently purchased for the Trinity House at Leith. His whole career was an arduous struggle, not with absolute failure, but with a success far from adequate to his aspirations, and he must be looked upon as the Scottish counterpart of Haydon. His genius was of wild and incoherent character and the numerous large canvases he painted with such enthusiasm quite failed to produce the effect he anticipated.

SCOTT, Dred. See Dred Scott Case.

SCOTT, Duncan Campbell, Canadian poet: b. Ottawa, Ontario, Aug. 2, 1862; d. there, Dec. 19, 1947. He was educated at Stanstead Wesleyan College and entered the Canadian civil service in 1879. He served as deputy superintendent of the Department of Indian Affairs, 1913–1932. Throughout his life he was sympathetic to the improvement of the Indian people. His first book, *In the Village of Viger* (1896) was a collection of French Canadian stories. His verse appeared in many periodicals; he also published *The Magic House* (1893); *Labour and the Angel* (1898); *New World Lyrics and Ballads* (1905); *Via Borealis* (1906); *John Graves Simcoe* (1905); *Poems* (1926), in the *Makers of Canada* series; and his last, *The Circle of Affection* (1947). He was joint editor of the *Makers of Canada* series.

SCOTT, Fred Newton, American educator: b. Terre Haute, Ind., Aug. 20, 1860; d. Ann Arbor, Mich., May 29, 1930. He was graduated at the University of Michigan in 1884 and received his doctor of philosophy degree in 1889. He became professor of rhethoric there in 1901–1921, professor of rhetoric and journalism 1921–1927, and emeritus professor of rhetoric 1927–1930. He was university editor in 1897–1900 and president of the Modern Language Association of America in 1907. He edited many classic and standard works, was joint author of *Guide to the Literature of Aesthetics* (1890); and of numerous textbooks on the English language. He was also the author of *Introduction to Literary Criticism* (1899); *Memorable Passages from the Bible* (1906); *The Standard of American Speech* (1926); and translator (with C. L. Meader) of *Plays by Leonid Andreyeff* (1915).

SCOTT, Sir George Gilbert, English architect: b. Gawcott, near Buckingham, July 13, 1811; d. London, March 27, 1878. While still a youth he was placed by his father in the office of an architect, where his tastes drew him mainly to the study of Gothic architecture. The Martyrs' Memorial, erected at Oxford in 1841, was the first work which brought him into notice. It was followed by the new church at Camberwell, and in the same year he was the successful competitor for the rebuilding of the church of Saint Nicholas at Hamburg, which had been destroyed by fire. Among his other designs are included the cathedral church of Saint John's, Newfoundland; Glasgow University; Leeds Infirmary; chapels at Exeter College, Oxford, and Saint John's College, Cambridge; the Memorial to the Prince Consort, London; Saint Mary's Cathedral at Edinburgh, etc. Toward the close of his life he was engaged in carrying out the restoration of the cathedral at Saint Albans. Among the restorations accomplished by him are those of many English cathedrals. He was the author of *Plea for the Faithful Restoration of Our Ancient Churches* (1850); *Conservation of Ancient Architectural Monuments* (1864); *Lectures on the Rise and Development of Mediaeval Architecture* (1878); *Personal and Professional Recollections* (1879).

Consult his autobiography, *Personal and Professional Recollections* (London 1879); articles in *Builder* and *Building News* of 1878.

SCOTT, Hugh Lenox, American soldier: b. Danville, Ky., Sept. 22, 1853; d. April 30, 1934. He was graduated from the United States Military Academy, June 14, 1876 and was commissioned second lieutenant June 15, 1876; first lieutenant June 28, 1878; captain of cavalry Jan. 24, 1895; major and assistant adjutant general, United States Volunteers, May 12, 1898; lieutenant colonel and assistant adjutant general, United States Volunteers, Aug. 17, 1899; major Feb. 25, 1903. Served in Sioux expedition, 1876; Nez Percé expedition, 1877; Camp Robinson, Nebraska and Cheyenne expedition, 1878; subsequently performed routine duty, principally with the Indians of the Plains, 1878–1891; honorable mention from War Department, 1891; in charge of investigation of Ghost Dance disturbances, 1890–1891; enlisted and commanded Kiowa, Comanche, and Apache Indians, troop L, seventh cavalry, 1892, until mustered out after five years' enlistment (last Indian troop mustered out); in charge of Geronimo's band of Chiricahua Apaches, 1894–1897. On duty at Bureau of Ethnology, Smithsonian Institution, writing work on sign language, Plains Indians, North America, November 1897, until outbreak of Spanish War. He served as adjutant general of 2d and 3d divisions of First Army corps, May 1898 to February 1899; adjutant general, Department of Havana, March 1899 to May 1900; adjutant general of the Division of Cuba until November 15, when the Division of Cuba was changed to Department of Cuba; adjutant general of Department of Cuba 1900–1902, and acting governor general of Cuba; took part in turning over the government of Cuba to the Cubans, May 20, 1902; was on duty with General Leonard Wood winding up the affairs of the Military Government of Intervention in Cuba, 1902. He served in the Philippines, 1903–1906, in the establishment of civil gov-

ernment, as governor and commander of troops in Sulu Archipelago; the conquest and pacification of the Sulu Archipelago and brought about the abolishment of slavery and the slave trade therein.

On 31 Aug. 1906, he was appointed superintendent of the United States Military Academy, with rank of colonel, and served as such until 31 Aug. 1910. On 3 March 1911, he was commissioned lieutenant-colonel of cavalry, and on 18 Aug. 1911, he reached, in due course of promotion, the rank of colonel, and was assigned to command of the Third cavalry. In November 1911, he was sent by the Secretary of War on a special mission to New Mexico and Arizona to adjust Indian troubles; on 23 March 1913 was promoted to rank of brigadier-general. During year April 1913 to April 1914, he commanded the United States troops on southern border from Texas to California, at time of our difficulties with Mexico. On the breaking out of severe troubles with the Navajo Indians on Beautiful Mountain, Arizona, November 1913, he was sent there with four troops of cavalry and was so successful in settling a difficult situation that he received the commendation of both the President and the Secretary of War. On 22 April 1914, he was appointed assistant chief-of-staff, and on 17 November of same year became chief-of-staff. In January 1915 he settled by diplomacy the impending conflict on the Mexican border at Naco, Arizona. In March 1915, he settled the Piute Indian trouble at Bluff, Utah. On 30 April 1915 he was promoted to rank of major-general. In August 1915, he was sent down to the Mexican border on a special mission, and was successful in recovering property of foreigners in Mexico confiscated by General Villa. In 1917 he was a member of the United States Commission to Russia and on 26 Dec. 1917 was made commander of the 78th Division of the National Army at Camp Dix, Wrightstown, N. J. In March 1918 he was made commander of Camp Dix. From 1919 he was a member of the Board of Indian Commissioners, and was also chairman of the Highway Commission of New Jersey. In 1910 he received the L.H.D. degree from Princeton University, and in 1915 the LL.D. degree from Columbia College. General Scott is a member of the Geological Society of America, Society of American Wars, Military Order of Foreign Wars, and Society of the Spanish-American War. He is author of various monographs and reports relating to the Plains Indians.

SCOTT, Hugh Stowell, English novelist, known by the *nom-de-plume* «Henry Seton Merriman»: b. Newcastle-on-Tyne, 1862; d. Ipswich, 10 Nov. 1903. He was a short while in business, made numerous sea voyages, finally devoted himself wholly to literature, and from the appearance of his novel 'The Phantom Future' in 1889 wrote a long series of somewhat melodramatic works of fiction, particularly successful when dealing with Russia and Nihilistic plots. His best book was perhaps 'The Sowers' (1896). Others are 'Suspense' (1890); 'With Edged Tools' (1894); 'Flotsam' (1896); 'Roden's Corner' (1898); 'The Isle of Unrest' (1900); 'The Vultures' (1902).

SCOTT, John Morin, American soldier and legislator: b. New York, 1730; d. there, 14 Sept. 1784. He was graduated at Yale University in 1746, and engaged in practice in New York. He was an early supporter of American rights against the British Crown, was one of the Sons of Liberty and an advocate of extreme measures. He was a leading member of the New York General Committee in 1775, and a delegate to the Provincial Congress in that year, In 1776 he was appointed brigadier-general in the Continental Army, and he participated in the battle of Long Island. He was secretary of State for New York in 1777–79, and served in Congress in 1780–83.

SCOTT, James Brown, American authority on international law: b. Kincardine, Ont., 3 June 1866. He graduated from Harvard in 1890, and studied international law at Heidelberg and Paris. After some years in academic work, he was appointed solicitor to the Department of State in 1896, serving until 1910. He served as technical adviser to many important commissions and conferences, including the Hague Peace Conference in 1907, the Peace Conference in Paris in 1919, and the Conference on Naval Disarmament in 1922. From 1915 he was president of the American Institute of International Law, and 1925–29 president of the Institute of International Law. From 1910 he was trustee and secretary of the Carnegie Endowment for International Peace. His books include 'The Hague Peace Conference of 1907' (1909); 'The United States of America' (1920); 'Robert Bacon, Life and Letters' (1923). Died Annapolis, Md., 25 June 1943.

SCOTT, Levi, American Methodist Episcopal bishop: b. Odessa, Del., 11 Oct. 1802; d. there, 13 July 1882. He was chiefly self-educated, was licensed as a local preacher in 1826 and in 1834–36 he was presiding elder of the Philadelphia Conference. He was principal of the Dickinson Grammar School in 1840–42, and was connected with the Methodist Book Concern, New York, in 1848–52. In 1852 he was elected and ordained bishop.

SCOTT, Orange, American clergyman: b. Brookfield, Vt., 13 Feb. 1800; d. Newark, N. J., 31 July 1847. He entered the New England Conference of the Methodist Episcopal ministry in 1822; was presiding elder of the Springfield, Mass., district in 1830–34, and of the Providence, R. I., district in 1834–35. From 1833 he was a zealous anti-slavery worker, and failing to receive the support of his bishop he withdrew from the Church in 1842. In 1843 he organized the Wesleyan Methodist Church at Utica, N. Y., becoming its president. He was editor of the *True Wesleyan*, an anti-slavery and anti-episcopal publication, in 1842–44. Failing health compelled his retirement from the ministry in 1846. Author of 'An Appeal to the Methodist Episcopal Church' (1838).

SCOTT, Sir Richard William, Canadian statesman: b. Prescott, Ontario, 24 Feb. 1825; d. Ottawa, 23 April 1913. He was admitted to the bar in 1848; was mayor of Ottawa in 1852; was elected a member of the Canadian assembly in 1857–63, and of the Ottawa assembly in 1867–73, where he was speaker in 1871–73. He was also member of council and commissioner of the Crown lands of Ottawa in 1871–73. He was a member of the Dominion Senate from 1874, and was Secretary of State

in 1874–78 and again in 1896–1908. He secured the enaction of the separate school act for the province of Ontario, and the Canadian temperance law known as the "Scott Act." He was knighted in 1909.

SCOTT, Robert Falcon, English naval officer and Antarctic explorer: b. Outlands, Devenport, 6 June 1868; d. Antarctic regions, 29 March 1912. He was educated at Stubbington, Fareham, and entered the navy in 1882. He become interested in Antarctic exploration and in 1900 after his promotion to commander he began preparations for his first exploring tour. In 1901–04 he commanded the Royal Geographic Antarctic Expedition, discovered Edward VII Land and reached the farthest point south then penetrated, lat. 82° 17′, long. 163°. Returning in 1904 his achievements were highly acclaimed. He was appointed naval assistant to the First Lord of the Admiralty in March 1909 but resigned later in that year to make preparations for his second journey of exploration in the Antarctic regions. He set out in 1910 on the *Terra Nova,* and established headquarters at MacMurdo Sound late in that year. (See ANTARCTIC REGIONS — *Exploration*). With four others in the party making the last part of the journey he reached the South Pole 18 Jan. 1912, after the longest sledge journey ever made, 1,842 miles. Here awaited him the bitter disappointment of the discovery that Amundsen had gained the Pole five weeks earlier. Scott photographed the tent surmounted by the Norwegian flag left by Amundsen and carried with him the letter to King Haakon according to the request left by his victorious rival. Scott's observation placed the pole only one-half mile from the point selected by Amundsen, and he planted the British flag there, made the necessary observations and set out upon the return journey. From the first ill-fortune dogged them; two of the party succumbed while Scott and the other two reached a point but 11 miles from One Ton Base and 155 miles from MacMurdo Sound on 20 March, with provisions for two days. They were held there by a blizzard and all died of hunger and exposure 29 March. Scott wrote in his diary until the last day, completing his records and leaving letters to the families of his companions, his own family, friends and officers, all stamped with matchless spirit. His observations of the expedition were in excellent order and of high scientific value. These and his diary were later published in the same style as his account of the first journey. The bodies of Scott, Wilson and Bowers were recovered in the spring of 1913. The officers of the navy contributed the funds for a bronze monument of Scott executed by his wife — who after his death was by Royal order known as Lady Scott — at Waterloo Place, London, in 1915. Author of 'Voyage of the Discovery' (2 vols.. 1905); 'Scott's Last Expedition' (posthumous, 2 vols., 1913).

SCOTT, Robert Kingston, American soldier and governor: b. Armstrong County, Pa., 8 July 1826; d. Napoleon, Ohio, 13 Aug. 1900. He studied medicine and engaged in practice in Henry County, Ohio, in 1851–57, later entering the mercantile business. In 1861 he was commissioned lieutenant-colonel in the 68th Ohio regiment, and in 1862 he was promoted colonel. He took part in the campaigns in Tennessee and Mississippi, and was commissioned brigadier-general of volunteers 12 Jan. 1865. He was assistant commissioner of the Freedman's Bureau in South Carolina in 1865–68 and was elected governor of South Carolina in 1868 and in 1870. He was charged in 1871 with being party to a fraudulent overissue of State bonds, but cleared himself and defeated the movement to impeach him. His administration was further complicated by the activities of the Ku-Klux-Klan, which compelled him to appeal to President Grant for United States troops to put down the disorder. He removed to Napoleon, Ohio, upon retiring from office, and in 1880 he shot and killed Warren G. Drury, but was acquitted on the grounds that it was accidental.

SCOTT, Thomas, English Anglican clergyman and Bible commentator: b. Braytoft, Lincolnshire, 4 Feb. 1747; d. Aston Sandford, Buckinghamshire, 16 April 1821. Possessing a strong love for learning he obtained a wide knowledge of both Latin and Greek, and in 1773 took orders in the Church of England. Through his friendship with John Newton he became an ardent Calvinist, defending Calvinism both in the pulpit and in the public press. He was chaplain of the Lock Chapel, London, in 1785–1801, and was then appointed rector of Aston Sandford, where he remained until his death. His reputation rests chiefly on his 'Commentary on the Bible' (1788–92), of which it is estimated that 100,000 copies have been sold. His other publications include 'The Force of Truth' (1779); 'Remarks on the Bishop of Lincoln's Refutation of Calvinism' (1812), etc. His collected 'Theological Works' were published (5 vols., 1805–08; 10 vols., 1823–25).

SCOTT, Thomas Alexander, American railway manager: b. London, Pa., 28 Dec. 1824; d. Darby, Pa., 21 May 1881. He entered the service of the Pennsylvania Railroad in 1850; became its general superintendent in 1858, and its vice-president in 1859. His services as superintendent of all government railroads and telegraph lines at the beginning of the Civil War placed him in the ranks of men of extraordinary ability, from which he was appointed Assistant Secretary of War in August 1861. This post he resigned in the following June, but re-entered the government service later and achieved distinction in the rapid construction of railroad lines necessary to the relief of General Rosecrans at Chattanooga. Again entering the service of the Pennsylvania Railroad, he inaugurated the policy of securing control of Western railway lines for the purpose of operating them in conjunction with the Pennsylvania lines. From 1874–80 he was president of the Pennsylvania and at various times of other lines.

SCOTT, Sir Walter, Scotch poet and novelist: b. Edinburgh, 15 Aug. 1771; d. Abbotsford, 21 Sept. 1832. He was the ninth child of Walter Scott, a writer to the Signet (lawyer), who belonged to the strenuous Border clan of Buccleugh, and of Anne Rutherford, a representative of another famous family. There were 11 other children, six of whom died in infancy. Walter at the age of 18 months suffered from spinal meningitis which caused a permanent

lameness of his right leg. On account of this he was early sent to the country, where he learned to love nature. Later his imagination was impressed by a journey to Bath and London. At the age of seven he was entered at the school in Edinburgh, where he displayed a love of sport and of good reading, though no great aptitude for hard, systematic study. For a short time he was at school at Kelso, where he formed his friendship with James Ballantyne. All accounts show that he was a manly, attractive boy who loved stories, poems like 'The Faërie Queene,' ballads and family legends.

In November 1783 he entered the University of Edinburgh, where his course was impeded by illness and his desultory habits were not overcome. His knowledge of the classics was slight, but he learned something of the chief Romance literatures and, while riding or walking for his health, he laid the foundations of his immense stock of antiquarian learning. In 1786 he was apprenticed to his father and, strength having come to him, he developed systematic habits of labor. He attended law lectures and debating clubs and in 1792 was called to the bar; but his interest in literature and history was no less than it had been, and he enjoyed the convivial society of his fellow law students. Despite his lameness, he was tall, strong, athletic and manly in appearance, full of life and merriment, and attractive to both sexes. An early attachment to a pretty young woman was to be expected, but impediments presented themselves and Scott was left with memories which bore witness to what is thought to have been "the strongest passion of his life."

His early work at the bar did not interfere with his making excursions into the Highlands and along the Border, which added to his stock of ballads and legends and gave him an extraordinary insight into the character of his countrymen. The life with which he came in contact had its seamy side, especially with respect to intemperance, but his was a romantic temperament that was not to be contaminated. A new interest also came to him in 1792, when, with his friend William Erskine, he began to study German. A few years later he attempted a paraphrase translation of Bürger's 'Lenore,' which he was persuaded to print along with another imitation of a ballad by the same author. This led to an introduction to "Monk" Lewis (q.v.), who brought about the publication in 1799 of Scott's translation of Goethe's 'Götz,' and persuaded his young friend to write some more ballads. Having thus had a taste of the pleasure of writing and publishing, though his success was far from dazzling, the young lawyer made plans to have his collection of ballads printed by his friend Ballantyne.

Meanwhile, his income from his profession had increased, and he had fallen in love with the attractive daughter of a French refugee, Charlotte Mary Carpenter (Charpentier). She had a small income settled on her, so that marriage did not seem a rash step. They took it in December 1797 and lived together congenially, although it does not appear that she was a specially qualified helpmate. In 1799 Scott was appointed sheriff-depute of Selkirkshire with a salary of £300 and few duties. Soon after, he prosecuted with energy the task of editing and publishing his important 'Minstrelsy of the Scottish Border,' the first two volumes of which appeared in 1802, the third in 1803. This contained some imitations of the old ballads, but fortunately did not include a narrative poem on the legend of Gilpin Horner, that was at first intended for it. The excluded poem, written in the free measure of 'Christabel' which a friend had recited to Scott, was slowly elaborated into 'The Lay of the Last Minstrel,' which was published early in 1805 and achieved great success. Here the creative genius of Scott first manifested itself in marked powers of narration, characterization and description, though scarcely in what may be called the strictly poetic gifts of high imagination, inevitable phrasing and noble harmony.

He now determined to follow literature seriously, but also to secure a more definite income than could be had from that or from his not specially brilliant work at the bar. With this end in view he undertook to perform the reportorial duties of an infirm clerk of session, who was to keep the emoluments of the office till his death or, as it turned out, until he was pensioned. Six years later (1812) Scott came into the comfortable salary of £1,300, but he had given much time to the clerkship and had done in addition work that would have worn out any less herculean constitution. He took some interest in politics, became a partner in James Ballantyne's printing business, proposed publishing schemes, wrote articles and edited books, working early in the morning, took rides (especially when he was at his beautiful home of Ashestiel near Selkirk), answered correspondents faithfully and yet found time for reading and study. There is scarcely another such energetic and copious genius of a high order in several spheres to be found in the annals of English literature.

His most important creative works during this period were 'Marmion' (1808) and 'The Lady of the Lake' (1810), which increased his fame as a poet; but they represent only a small part of his labors. He edited 'Dryden' in 18 volumes (1808), prefixing an elaborate biography; he superintended a new edition of the 'Somers Tracts' in 13 volumes, to say nothing of about eight smaller undertakings of a similar kind; he helped to establish *The Quarterly Review*, and he formed an unlucky partnership with John Ballantyne, brother of James, to conduct a publishing business. If they could have confined themselves to publishing Scott's poetry, even after the unenthusiastic reception of 'Rokeby' (1813) showed Scott that he could not successfully rival Byron and that his own talents must be exercised in another sphere, the partners, despite John Ballantyne's unbusinesslike habits, might have made a passable success; but Scott thought himself a born promoter and literary adviser, and he was generous to a fault with authors who were his friends. Miss Seward's works, Beaumont and Fletcher's plays edited by Weber, *The Edinburgh Annual Register* and other undertakings fell so flat it seemed best in 1813 to wind up the publishing business.

These difficulties were tided over by loans and by the transfer of more or less worthless books to the publisher Archibald Constable, and the success of the "Waverley" novels for some years made Scott feel more confident of his financial position than a prudent man should have felt. His was, indeed, a glorious genius

with a splendid energy to match, but he had also costly tastes which he aspired to gratify on a magnificent scale. His social position meant much more to him than his fame as a writer, and to maintain and increase that position he thought that he must acquire large estates and dispense a profuse hospitality. He began to realize his dream in 1812 when he bought the small farm of Abbotsford. Then he added one piece of land after another until he had spent about £30,000; he built himself a castle, and he lived on a scale which, in view of his tangled affairs, even his large income did not justify. It was only the discovery of his incomparable gifts for prose romance that his financial ruin was postponed for so long.

Early in July 1814, just after the edition of Swift in 19 volumes marked the culmination of Scott's career as an editor though not as a critic, the romance 'Waverley, or 'tis Sixty Years Since,' an anonymous story dealing with the period of the Young Pretender, made its appearance and took the novel-reading world by something like a storm, six editions being needed before the close of the year. Scott had begun the tale as far back as 1805, the year of the «Lay,» but Erskine and James Ballantyne, who wanted another well-paying poem, discouraged his attempt, and the easy-tempered author put it aside. In 1808 his attention was again directed to historical fiction through the fact that he undertook to prepare for the press an unfinished romance by the antiquary Joseph Strutt, entitled 'Queenhoo Hall.' He had always had a faculty for narrative and had enjoyed the tales and novels of others, especially, in recent years, the Irish stories of Miss Edgeworth (q.v.). We have already seen that the comparative waning of his poetic fame before that of Byron — illustrated by the failure of 'The Bridal of Triermain' (1813) which was anonymous, and to be confirmed later by the reception of 'The Lord of the Isles' (1815) and of 'Harold the Dauntless' (1817) — led him to think that he must transfer his energy to other fields, and he would probably have tried prose fiction again, sooner or later, even if a famous accident had not recalled his early attempt to his mind. One day at the end of 1813, while searching for some fishing tackle, he found the manuscript of his forgotten tale in a drawer. He read it over and determined to complete it. This time Erskine had the good sense to approve his friend's experiment, and Scott, writing with his phenomenal steadiness and rapidity, finished the last two-thirds of the book in three weeks. He did not put his name to it, partly for fear of losing some of his reputation if it failed, partly because novels were still looked upon in the main as an inferior form of literature in which a dignified officer like a clerk of session would not be expected to dabble.

Of course his fears proved to be ill-founded and there was no necessity for his preserving his anonymity, but he seems to have liked the mystery involved, and perhaps he thought that by remaining «The Great Unknown» he appeared to be less of a professional man of letters and in consequence more of a country gentleman of high standing. There have been squeamish people who could not easily forgive Scott for his innocent deceptions and his failure to come out into the open as a proud representative of his art; but it is not difficult to understand him and it seems idle to be irritated with him. After all, he did not succeed thoroughly in his attempt to remain anonymous, for competent critics like John Wilson (q.v.) saw in the author of the novels the man who had written the poems and edited the ballads. The matter was enough discussed, however, to lead to the writing of J. L. Adolphus's «Letters» to Heber on the Waverley Novels and the question of their authorship (1821), but even after this unmasking Scott continued to wear his tenuous disguise for about six years.

'Waverley' was followed shortly by 'Guy Mannering,' which illustrated his genius as a painter of Scotch life and a revealer of Scotch character — especially in the lower ranks of life. Like its predecessor it was dashed off, but was none the less immensely successful. Scott was delighted, particularly as money began to flow in and he was thus enabled to pay obligations and buy more land. He visited London and was over-enchanted at the flattering reception given him by the Prince Regent; but then Scott was a born Tory and consequently not likely to see the spots in a royal sun. His cordial relations with Byron were much more to his credit, especially as he championed that unfortunate poet when all England was crying out upon him. Later he visited Waterloo and met Wellington, who greatly impressed him. The literary results of this tour, 'Paul's Letters to His Kinsfolk' and 'The Field of Waterloo,' a poem, were failures; yet Scott was a great martial poet, would probably have been a soldier if he had not been lame and could scarcely have had a more congenial subject. Fortunately no decline was visible in 'The Antiquary'; and in 'Old Mortality,' which came later in 1816, forming with 'The Black Dwarf' the first series of 'Tales of My Landlord,' Scott produced a story which in construction, characterization, historical imagination and sympathy, power of description and broad human interest, ranks deservedly, not only very high in the list of his own creations, but as one of the masterpieces of English fiction. The style is not flawless, the psychology is not penetrating, the art in general is less subtle and refined than that to which the novelists who have followed in Scott's wake have accustomed us; but in the essential points of wholesomeness and truth to nature and of large, copious, equable creative powers, Scott, as his influence upon other lands and generations plainly shows, has little reason to fear comparison with any of his successors.

At the close of 1817 'Rob Roy' followed and six months later came 'The Heart of Midlothian,' which to many readers marks the culmination of Scott's genius as a novelist. The public responded heartily to every fresh appeal, but, unfortunately, Scott's popularity was used as a club to force publishers to take over the worthless stock of his publishing firm, and Scott and the Ballantynes were inextricably involved with Constable, who finally became Scott's sole publisher and dragged him down in his own failure. Meanwhile, the tragic 'Bride of Lammermoor,' which appealed so deeply to the sombre genius of Poe, and 'The Legend of Montrose' appeared in 1819, despite the fact that Scott had suffered tortures from a stomachic trouble. The heroic way in which he dictated the 'Bride' to Laidlaw and John

Ballantyne is well known, as is also the fact that, when he got up from an illness which it was feared would prove fatal, he could not recall «a single incident, character or conversation» in the story. Yet such was his pluck that he not only began a new book, but actually branched out into a new type of novel by crossing the border and throwing his scene back into a remote past. 'Ivanhoe,' for so this important venture was named, appeared at the close of 1819 and may be regarded, not as the best, but as the most popular of all Scott's works and as the one which made him a favorite and a great influence throughout Europe. The brilliance of its descriptions and the thrilling interest of its plot continue to atone for the carelessness of its construction and the untrustworthiness of its representation of the epoch in which its scene is laid.

Scott was now at the height of his literary and his social renown. In 1820 he accepted a baronetcy from George IV — he had previously declined the laureateship — and published 'The Monastery' and 'The Abbot.' The next year came the popular 'Kenilworth' and 'The Pirate,' followed in 1822 by 'The Fortunes of Nigel,' and in 1823 by 'Peveril of the Peak.' A stroke that seemed apoplectic did not affect the power of that masterly portrayal of the age of Louis XI, 'Quentin Durward' (1823), but 'Saint Ronan's Well,' a novel of contemporary manners, has never been popular, a fate shared by 'Redgauntlet' (1824) and by the first of 'The Tales of the Crusaders' (1825) — 'The Betrothed.' The companion of the last named, 'The Talisman,' revealed, however, the old Scott; but despite the merits of this and of 'Ivanhoe' and 'Kenilworth' and the greatness of 'Quentin Durward,' the novels of this second period do not deserve to rank with those of the first. The stories of his period of financial ruin, 'Woodstock' (1826), 'The Fair Maid of Perth' (1828), 'Anne of Geierstein' (1829), were the work of a still vigorous and an even more heroic man; those of his complete physical breakdown, 'Count Robert of Paris' and 'Castle Dangerous' (1831), call for no criticism.

Meanwhile, the crash had come. Scott, confident in his powers, had not narrowly scrutinized his relations with the Ballantynes and Constable and, in his mania for lands and buildings and lavish hospitality, he had raised money on Constable's notes given for novels yet unwritten. A general period of depression came on and Constable failed in January 1826, bringing down with him the firm of James Ballantyne and Company, of which Scott was a partner. The result was that as Ballantyne was practically without resources, Scott felt bound in honor to pay off alone a debt of nearly £120,000. How he set to work on 'Woodstock,' how he refused all offers of help, how he made in two years, especially through his 'Life of Napoleon Buonaparte' (1827), the enormous sum of £40,000, how he bore the loss of his wife (1826) and his own infirmities, how he turned his pen to every possible task of profit — 'Tales of a Grandfather' (1829) combined pleasure with profit, — how he wrote admirable prefaces for a new edition of his novels — all this is familiar to the reader of Lockhart.

Early in 1830 he had a paralytic stroke and after that his efforts to save Abbotsford, where his creditors let him continue to reside, as the seat of the family he had so longed to establish, became truly pathetic. In April 1831 he had a still more serious stroke and a little later he suffered perhaps even more acutely from the rude treatment he received from the mob at Jedburgh, where he had gone to protest against the proposed reform of Parliament. A born conservative and ever a true child of the past, it was time for him to say good-bye to a world that was entering upon a series of rapid and far-reaching changes. After his last novel had been published, it seemed that he ought to try a milder climate in order to prolong his life. The government offered him the use of a frigate; and, after a notable parting with Wordsworth, he set out for Plymouth to take it. He visited Malta, Naples and Rome, then the Tyrol and the Rhine region. At Nimeguen, on 9 June 1832, he was severely stricken and was shortly after brought home to Abbotsford, where, on the afternoon of 21 Sept. 1832, he died, surrounded by his children.

He had been what, in his last words, he told Lockhart to be — a good man. His foibles and faults — we cannot lay the whole blame for his misfortunes on the Ballantynes and Constable — when they were not those of his class and his age, were such as detracted little from the greatness of his character, and much the same thing may be said of his defects as a writer. There have been few nobler spirits in the world's history; nor is it clear that since Milton's day a more illustrious or, take him all in all, a greater writer has been born within the lands that use the English tongue. Abbotsford yields only to Stratford as a literary shrine, but it is an ironical comment on Scott's labors to aggrandize his family that no direct male heir should welcome pilgrims to it. See GUY MANNERING; HEART OF MIDLOTHIAN: IVANHOE; KENILWORTH; LADY OF THE LAKE; MARMION; OLD MORTALITY; QUENTIN DURWARD; ROB ROY; also SCOTT, LOCKHART'S LIFE OF.

Bibliography. — The standard editions of Scott's poems and novels are those in 11 and 48 volumes with his prefaces (1829–33). The miscellaneous works fill 28 volumes in the edition of 1834–36. Of the numerous later editions mention may be made of the «Cambridge Edition» of the poems edited by H. E. Scudder (1 vol.) and of the «Border Edition» of the novels (48 vols., 1892–94) with excellent introductions, by Andrew Lang. The chief authority for Scott's life is his son-in-law, J. G. Lockhart's (q.v.) admirable biography (7 vols., 1837, but best read in the Cambridge Edition, Boston, 1902). There are short lives by R. H. Hutton ('English Men of Letters'), C. D. Yonge ('Great Writers' — with a bibliography), W. H. Hudson (1901), Lang, 'Literary Lives' (1906), Norgate, G. Le G., 'Life of Sir Walter Scott' (London 1906), Buchan, J., 'Some Notes on Sir Walter Scott' (N. Y. 1924). Attention should also be given to Scott's last 'Journals' (1890), and his 'Familiar Letters' (1894) edited by David Douglas. For criticism consult Lang's biography and introductions; F. T. Palgrave's introduction to the «Globe» edition of the poems; Leslie Stephen, 'Studies of a Biographer' (Vol. II, 1898) and 'Hours in a Library' (Vol. I); Ruskin, 'Fors Clavigera' and the histories of English literature.

WILLIAM P. TRENT,
Late Professor Emeritus of English Literature, Columbia University.

SCOTT, Walter, Canadian statesman: b. Oct. 27, 1867; d. March 23, 1938. He was educated in the public schools, and early settled in the North West Territory, where he engaged in printing and journalism. He owned and edited various newspapers in 1892–1906, and in 1900 was elected to the Canadian House of Commons. He was instrumental in creating the provinces of Saskatchewan and Alberta in 1905, became the leader of the Liberal party in Saskatchewan and served as its first Prime Minister in 1905–1917.

SCOTT, Walter Dill, American psychologist: b. Cooksville, Ill., May 1, 1869; awarded the D.S.M. for "devising, installing and supervising the personnel system in the U.S. Army, World War I."

SCOTT, William Amasa, American political economist: b. Clarkson, Monroe County, N. Y., April 17, 1862; d. Madison, Wis., Nov. 6, 1944. He was graduated at the University of Rochester in 1886, was professor of history and political science in the University of South Dakota in 1887–1890; instructor and graduate student at Johns Hopkins University, 1890–1892, and received his Ph.D. from that institution in June 1892. He became assistant professor of political economy at the University of Wisconsin, 1892–1893; associate professor there, 1893–1897, professor 1897–1931, and emeritus professor from 1931–1944. From 1900 until 1927 he had acted as director of the school of commerce in that institution. In 1911 he received the honorary degree of LL.D. from the University of Rochester. In addition to many articles and monographs on economic and educational topics in encyclopedias and periodicals, he published *Repudiation of State Debts* (1893); *Money and Banking* (1903; revised and enlarged, 1910–16–26); *Money* (1914); *Banking* (1914); chapter on "The Austrian School and Recent Developments" in Ingram's *History of Political Economy* (new and enlarged edition, 1915); an introduction to *Recent Literature on Interest* (1884–1899) by Eugen von Böhm-Bawerk, translated from the German; and *The Development of Economics* (1933).

SCOTT, William Bell, Scottish poet and painter, brother of David Scott (q.v.): b. Edinburgh, Sept. 12, 1811; d. Perthshire, Nov. 22, 1890. He received his art education from his father, an engraver, and in 1834 he published his first poetry in magazines. His picture, *The Old English Ballad Singer,* was exhibited in 1838 and established his reputation as a painter. For many years he exhibited in the Royal Academy but his main activity was literary. His poetical works include *The Year of the World* (1846); *Poems by a Painter* (1854); and *Ballads* (1875), etc. His other writings include *Lectures on Art* (1861); and *Albert Dürer: His Life and Works* (1869).

SCOTT, William Berryman, American geologist, brother of Gen. H. L. Scott (q.v.): b. Cincinnati, Ohio, Feb. 12, 1858; d. Princeton, N. J., March 29, 1947. He was graduated at Princeton in 1877 and obtained his Ph.D. at Heidelberg in 1880. From 1884 to 1930 he was professor of geology and paleontology at Princeton. He was joint editor of the 9-volume reports of the Princeton expeditions to Patagonia, which he also conducted. The recipient of numerous scientific awards, he was president of the American Philosophical Society in 1918–1925. His works include: *The Theory of Evolution* (1917); *Physiography* (1922); and *The Mammalian Fauna of the White River Oligocens* (1935–1941).

SCOTT, Winfield, American soldier: b. near Petersburg, Dinwiddie County, Va., June 13, 1786; d. West Point, N. Y., May 29, 1866. After study at William and Mary College in 1805, he read law at Petersburg, and having obtained his license, rode the circuit and was retained in several causes. In 1808 he obtained a captain's commission in the United States army, and in 1809 embarked with his company from Norfolk to New Orleans. On June 18, 1812 war was declared by Congress against Great Britain (see WAR of 1812). On July 6 following, Scott was commissioned the lieutenant-colonel of the 2d Artillery. He at once was ordered to mobilize his regiment at Philadelphia and soon after, at his request, to proceed to the Canadian frontier. He arrived at the headquarters of Brig. Gen. Alexander Smyth October 4. The affair at Queenstown took place on October 13. Scott did not take part in the successful attack on the heights, but commanded the American forces in the ensuing battle, and after brisk fighting was obliged to surrender to much superior numbers. He was soon after exchanged, in March 1813, was appointed adjutant general with rank of colonel, and at about the same time was promoted colonel of his regiment. With the regiment he joined Gen. Henry Dearborn on the Niagara frontier, became Dearborn's chief of staff, led the successful attack on Fort George May 27, commanded the rear guard in the retreat from Stony Creek to Fort George and cooperated with the naval forces in the descent on Burlington Heights and York. Promoted March 9, 1814 to be brigadier general, he established a camp of instruction at Buffalo. Scott's brigade and Ripley's crossed the Niagara July 3, 1814; Fort Erie was invested and captured; and on the 4th Scott moved toward Chippewa. On July 5, occurred the Battle of Chippewa (q.v.). Scott greatly distinguished himself, and Gen. Jacob J. Brown, commanding, declared that to Scott more than any other the American victory was due. The Battle of Lundy's Lane (q.v.) followed on the 25th, where Scott again displayed great ability. These battles, both won chiefly by Scott, fully established American military prestige. For his services, Scott received a gold medal from Congress, and was made brevet major general (from July 25). He declined to act as secretary of war, and was in Europe in 1815–1816. In 1826 he was made president of a board of army and militia officers convened at Washington for the consideration of various military questions, and in 1829 was assigned to the command of the Department of the East. In July 1832 he was ordered to Illinois to take command of the forces in the Black Hawk War (see BLACK HAWK), and left Buffalo for Chicago with 1,000 troops. He was not in the active campaign, but cooperated with Governor John Reynolds of Illinois in concluding treaties with the Sacs, Foxes, Winnebagoes, Sioux and Menominees. At the time of the nullification troubles he was sent to South Carolina (1831–1832), where he was successful

in averting civil war. He prosecuted the Seminole and Creek campaigns in Florida (1836), and superintended the removal of the Cherokees from Georgia to their reservation west of the Mississippi. On June 25, 1841 he became major general and general in chief of the army. In 1839 at the Whig Convention at Harrisburg, Pa., Scott was presented as a candidate for the Presidency, though he urged Clay as first, Harrison as second, choice and the 62 votes cast for him went ultimately to Harrison. He was ordered on Nov. 23, 1846 to Mexico to take charge of the forces there. He assembled his troops at Lobos Island, moved transports in February, landed at Vera Cruz March 9 and effected its surrender March 29. From this time he proceeded on the uniformly victorious campaign which practically closed the war by his entry into the City of Mexico on September 14. (For complete account see MEXICAN WAR and articles on various battles.) At the close of the war Scott relinquished the command to Gen. W. O. Butler, and returned to the United States, where he received a gold medal from Congress, and was a candidate in 1848 in the Whig Convention which nominated Taylor for the presidency. In 1852 he was defeated by Franklin Pierce, and in 1855 made brevet lieutenant general. In 1859, when the American and British governments were adjusting the northwestern boundary question, he was sent to Puget Sound to adjust the difficulties caused by the precipitate occupation of San Juan Island. At the outbreak of the Civil War, he took command at Washington Dec. 12, 1860, provided for the safety of the national capital, and the organization of the army, but resigned the command to McClellan Nov. 1, 1861. Scott was a strict disciplinarian and this, with his formality, led to his army nickname of "Old Fuss and Feathers." As to his skill as a military leader there can be no question. He gained notable distinction in two wars. Webster, in a Senate speech (Feb. 20, 1848), called the Mexican War "the most brilliant campaign on recent military record," and Grant writes of the faultless strategy at Churubusco. His political defeats in no way detracted from his reputation. He published *General Regulations for the Army* (1825) and *Infantry Tactics* (1835).

Consult *Memoirs* (1864); Barnes, J. W., *Giant of Three Wars* (1903); Elliott, C. W., *Winfield Scott, the Leader and the Man* (New York 1937); Smith, A. D. H., *Old Fuss and Feathers, the Life and Exploits of Winfield Scott* (New York 1937).

SCOTT, Life of. John Gibson Lockhart's biography of Sir Walter Scott is often mentioned as a serious rival of Boswell's *Life of Johnson.* The works have many points in common. Each has for a subject a great man in English literature; each was written by a man intimately acquainted and thoroughly in sympathy with the subject; each is constructed upon a large plan, with canvas filled even to the smallest details. Furthermore, Lockhart followed the autobiographical plan of Boswell. Beyond these resemblances, however, there are striking dissimilarities. So far as command over language is concerned, Lockhart was probably superior to Boswell; but as a biographical artist he was clearly inferior. He did not possess Boswell's dramatic skill, nor his ability to report a conversation, nor his discrimination in selecting the most important material.

The *Life of Scott* is probably the longest biography of established rank in the English language. Carlyle, who reviewed it before the publication of the seventh and last volume, deplored what seemed to him the excessive length of the narrative. "Study to think it nothing miraculous," he wrote, "that seven biographical volumes are given where one had been better . . . Scott's biography, if uncomposed, lies printed and indestructible here, in the elementary state and can at any time be composed, if necessary, by whosoever has a call to that." Carlyle's opinion has in the main been justified. In 1911 Sir Sidney Lee expressed his conviction that "Lockhart's merit is mainly due to the excellence and the abundance of the raw material provided for him in Scott's ample journals and correspondence." In short, the *Life of Scott* is a Gothic cathedral, overawing us by its size and magnificence, rather than a Greek temple, gaining our admiration by its artistry and simplicity.

With all of its limitations, however, the biography is great. The combination of subject and biographer is sufficient to guarantee its greatness, and, to a certain extent, its finality. Lockhart, personally acquainted with Scott since May 1818, became his son-in-law on April 29, 1820, when he married Sophia Scott. The biography was completed in 1838, six years after Scott's death. Lockhart had access to all documents; his work, therefore, together with the journals of Scott later published in full, must always remain the great mine of information from which later biographers must dig. In writing the life of his father-in-law Lockhart had set "the truth and the fear of God" before his eyes; his work, consequently, is not a panegyric; but, like Boswell's *Life of Johnson,* a straightforward account of faults as well as of virtues. Professor Hugh Walker, in *The Literature of the Victorian Era* (pp. 920-923), highly commends Lockhart upon the skill and insight with which he interprets certain manifestations of Scott's character, particularly his love of display and his consequent lavish expenditure. The style of the biography is admirable; several passages, notably the description of Scott's death, are among the best in English literature. All in all, the work, by its very length and exhaustiveness, forms a noble monument to the memory of a man who did all things on a large and magnificent scale.

WALDO H. DUNN.

SCOTT CITY, city, Kansas, and seat of Scott County, 72 miles northwest of Dodge City, altitude 2,970 feet above sea level. Transportation facilities are the Santa Fe, Missouri Pacific railroads, state and federal highways, and there is a municipal airport.

The community is largely agricultural, with an oil field and refinery in the southern part of the county. In 1951 there was under construction a new electric power plant which would serve several cities and counties with electric power. In Scott County there were over 50,000 acres of land under irrigation from deep-water wells. A great many of these wells were powered by electricity.

History.—Scott City was named in honor of Gen. Winfield Scott. The nearby 1,280-acre Kansas State Park contains the ruins of El Quartelejo, the northernmost Indian pueblo in the United States, which many historians believe is Quivira, for which Coronado was seeking on his journey through the southwest. The city was incorporated in 1887. The government is by mayor and council. Pop. (1950) 3,204.

SCOTTDALE, skŏt'dāl, borough, Pennsylvania, in Westmoreland County, altitude 1,042 feet; on the Baltimore and Ohio and the Pennsylvania railroads; by rail, 48 miles southeast of Pittsburgh; in direct line, 16 miles south of Greensburg, the county seat. Surrounding the city is an area partly agricultural, producing potatoes, grain, and corn, and partly devoted to the mining of bituminous coal. Manufactures include the making of castings, machine parts, and tool handles. There is a public library. The borough has a number of musical organizations, including a choral club, a men's chorus, and several bands. Scottdale was named for Thomas A. Scott, who became president of the Pennsylvania Railroad Company in 1874. Government: burgess-council. Pop. (1950) 6,249.

SCOTTI, Antonio, Italian operatic baritone: b. Naples, Jan. 25, 1866; d. Feb. 26, 1936. He studied under Mme. Trefari Paganini, and made his début in Malta in 1889. His success was instantaneous, and he filled engagements in Italy, South America, Spain, Russia and other countries. In 1899 he sang at Covent Garden in London, and in the same year was engaged for the Metropolitan Opera House in New York. He thereafter remained a member of its company. His most famous part was that of Scarpia in *Tosca.*

SCOTTISH GAELIC LITERATURE. The Gaelic spoken in the Highlands and islands of Scotland forms one of the subdivisions of the Gaelic language, the other two being Irish and Manx. (See CELTIC LANGUAGES; GAELIC LITERATURE.) It was introduced into the southern part of Argyll by the Dalriads, who emigrated from Ireland in the 6th century, and there established the subkingdom of Dalriada. The language spread until it became paramount, and it was used at court as late as the reign of Malcolm Canmore. Gaelic, which was the language of the district of Buchan in Aberdeenshire, in the 12th century, and was spoken in Galloway in Queen Mary's reign, gradually retired north and west beyond the Highland line, until now its strongholds are Arran and the Hebrides, the counties of Argyll and Inverness, Ross and Sutherland, and parts of Perth and Caithness.

A strong Gaelic-speaking colony was founded in Carolina in the 18th century. In 1772 the first Gaelic-speaking immigrants landed in Cape Breton Island, Nova Scotia, and in the first quarter of the 19th century some 25,000 landed in that part of Canada. Prince Edward Island, Glengarry in Ontario and other parts also received settlers who spoke the Gaelic tongue and have maintained it to the present time. One of the objects of Lord Selkirk in founding the Red River Settlement was the formation of a Gaelic-speaking colony, which, through difference in language, would be proof against any tendency to amalgamate with the Americans. Within the past half century there has been a marked revival of interest in the Gaelic literature of the Highlands, one of the proofs of which was the founding of a Gaelic chair in Edinburgh University in 1882.

For nearly 300 years Scotland and Ireland had a common literary tradition, and the tales of the great Irish legendary heroes were current in the Scottish Highlands. Adamnan's life of St. Columba, written in the island of Iona before 713 A.D., is the first literary product of Gaelic Scotland that survives. The *Book of Deer* is of the 9th century; the *Book of the Dean of Lismore,* by Sir James MacGregor and his brother Duncan, is a manuscript collection of date 1512–1526. John Knox's *Liturgy* was the first book to be printed in the Gaelic dialect (1567). Long after the invention of printing the output was small in this language; only some 20 books had been printed in Gaelic up to the time of the Rebellion of 1745. A valuable collection of manuscripts is deposited in the Advocates' Library, Edinburgh. The language has been peculiarly rich in poets, a succession of notable bards appearing for about 300 years. Among them may be cited Mary Macleod (b. 1659); John Macdonald, a member of the Keppoch family; Alexander Macdonald, an officer in Prince Charles's army; Robert Mackay (Rob Donn, 1714–1778); Ban McIntyre (1724–1812); Ewen McLachlan of Aberdeen (1755–1822), and William Livingston of Islay (1808–1870).

SCOTTISH PHILOSOPHY, School of, the school of philosophy founded by Thomas Reid, whose aim was to disprove the skeptical conclusions of Hume, which had obtained a wide vogue in Great Britain and on the Continent. Besides Reid, the most noted representatives of the Scottish philosophy were Dugald Stewart (1753–1828); Sir William Hamilton (1788–1856); W. Whewell, master of Trinity College, Cambridge (1794–1866); Henry Calderwood (1830–1897). James McCosh (president of Princeton University from 1868 to 1888) and Noah Porter (president of Yale University from 1871 to 1886) belonged to the same school, and as teachers of philosophy contributed largely to its influence in the United States.

SCOTTSBLUFF, skŏts'blŭf, city, Nebraska, in Scotts Bluff County, altitude 4,000 feet; on the North Platte River, opposite Gering, the county seat; on the Chicago, Burlington and Quincy Railroad, and served by the Union Pacific at Gering; by rail, 431 miles west of Lincoln; on state and federal highways; also airline service. In irrigated country, producing sugar beets, potatoes, beans, with stock raising as an important occupation, Scottsbluff's industrial establishments engage in the processing, canning or packing, and shipping of foods. The city has a public library, a junior college, many churches, and two hospitals; also, numerous memorials of pioneer days.

About three miles southwest of the city is the Scotts Bluff National Monument, a tract of over 2,000 acres, established in 1919. The monument, a great bluff which rises some 750 feet above the North Platte River, served as a landmark on the Oregon Trail. At the base of the monument is the Oregon Trail Museum. Government is by council-manager. Pop. (1950) 12,840.

SCOTTSBORO, city, Alabama, and Jackson County seat, 70 miles west of Chattanooga, Tenn., altitude 45 to 80 feet. It is served by the Southern Railroad. Agricultural products include cotton, corn, and hay. The chief industries are the manufacture of bedspreads, men's underwear, bath mats. There are also lumber mills, bottling works, and cotton gins. The facilities for fishing, boating, and swimming are exceptional as the county has many fresh-water lakes and streams.

The city was incorporated about 1898 and has mayor and council government. Pop. (1950) 4,731

SCOTUS, skō'tŭs, **Johannes Duns,** Franciscan theologian and philosopher, known as the Subtle Doctor: b. Maxton, Roxburgh, Scotland, 1265/1266; d. Cologne, Germany, Nov. 8, 1308. He entered the Franciscan Order in 1278 and was ordained priest in 1291. Scotus seems to have studied in Paris from 1293 to 1296 and to have returned to England to lecture on the *Sentences* of Peter Lombard at Oxford. In 1302 he was teaching at Paris, but was banished thence in June 1303 for his support of Pope Boniface VIII against King Philip IV the Fair of France. In 1304 he again taught in Paris. It is possible that he left once more for England in 1306, but he was certainly back in Paris in 1307. From that city Scotus was transferred to Cologne, where he died suddenly at the age of 42 or 43.

In the Roman Catholic Church, Scotus is the leader, with St. Bonaventura, of the Franciscan school of philosophy and theology, just as St. Thomas Aquinas is the leader of the Dominican school. Because of his depth of thought and sharpness of mind his place as philosopher and theologian is among the highest. Scotus' name has gone down to history as closely bound with the doctrine of the Immaculate Conception, of which he became the champion. See SCOTISM; SCHOLASTICISM.

The canon of Scotus' work has long been uncertain, partly because his works, which include treatises on grammar, logic, metaphysics, and theology, have descended to us mainly in reports written by his pupils, often with additions of the reporter's own composition. Recent studies have proved that certain works long attributed to Scotus are definitely spurious. The *Opus Oxoniense* and *Reportata Parisiensia,* his commentaries on the *Sentences* of Peter Lombard, are undoubtedly authentic and constitute the best source of Scotus' doctrine.

Scotus' works were edited by Luke Wadding (12 vols., Lyon 1639) and reprinted by L. Vivès (26 vols., Paris 1891–1895). A commission of Franciscan scholars headed by Father Charles Balić is preparing a critical edition of all Scotus' works (1950–).

Consult Heidegger, Martin, *Die Kategorien- und Bedeutungslehre des Duns Scotus* (Tübingen 1916); Harris, C. R. S., *Duns Scotus,* 2 vols. (Oxford, Eng., 1927); Bettoni, Efrem, *Duns Scoto* (Brescia 1946); Gilson, Étienne H., *Jean Duns Scot* (Paris 1952).

BERNARDINO M. BONANSEA, O.F.M.

SCOTUS ERIGENA, ĕ-rĭj'ĕ-nà, **Johannes,** philosopher and theologian: b. about 815; d. about 877. His literary pseudonym was JOHANNES IERUGENA or ERIUGENA (meaning perhaps "Irish-born"), for he probably was born in Ireland, but perhaps of Scottish parents. Most of the circumstances of Scotus' life are either vague or conjectural. It seems, however, that after some schooling at home he went to France, where he was attached about 847 to the court of Charles I the Bald as director of the palace school. In 851 he wrote, at the request of Hincmar, archbishop of Reims, his *De Praedestinatione* (*On Predestination*), which defended the freedom of the will and which later met conciliar condemnation. Between 860 and 862 he translated from Greek the works of the Pseudo-Dionysius, notably his *De Caelesti Hierarchia* (*On the Heavenly Hierarchy*), a treatise destined to influence profoundly the development of mysticism in France. Erigena's own chief work is his *De Divisione Naturae* (*On the Divisions of Nature,* 862–866), which incurred charges of pantheism and freethinking which have never been entirely dispelled. He is generally conceded, however, to have possessed the finest philosophical mind of his time and his *De Divisione Naturae,* though condemned by Pope Honorius III in 1225, takes its place as the first real theological *summa* in the West.

Consult Bett, Henry, *Johannes Scotus Erigena; a Study in Mediaeval Philosophy* (Cambridge, Eng., 1925); Cappuyns, Maïeul, *Jean Scot Érigène* (Louvain 1933); and Pra, Mario dal, *Scoto Eriugena* (Milan 1941).

SCOURING RUSH. See DUTCH RUSH; FERNS AND FERN ALLIES—*Equisetinæ.*

SCRAG WHALE, name loosely applied by American whalers to any lean, undersized, or immature balaenopteroid whale. Sometimes the name is applied generally to various species of these "whalebone" whales, such as (1) the finback whale of the North Atlantic (*Balaenoptera physalus*), which grows to 60 or more feet in length, and (2) the related pygmy right whale of the South Pacific (*Neobalaena marginata*), which attains a length of only about 20 feet. See WHALE.

SCRANTON, skrăn't'n, **George Whitfield,** American manufacturer: b. Madison, Conn., May 23, 1811; d. Scranton, Pa., March 24, 1861. In 1839, in partnership with his brother Selden, he purchased an iron furnace at Oxford, N. J., and operated it with great success. In 1840 he helped to form the Lackawanna Iron and Coal Company, which acquired extensive coal-bearing lands in Pennsylvania's Lackawanna Valley, including the present site of the city of Scranton, which he founded in that year. His success in smelting iron with anthracite coal (1842) and the growing railroads worked together to bring him great wealth. For several years Scranton was president of the Delaware, Lackawanna, and Western and the Cayuga and Susquehanna railroads. He served as a Republican in the House of Representatives from 1859 until his death.

SCRANTON, city, Pennsylvania, seat of Lackawanna County, situated on the Lackawanna River, about 118 miles north-northwest of Philadelphia. Hemmed by the Moosic Mountains on the east and the north and by the West Mountains on the west, it is in the heart of the rich Pennsylvania anthracite coal region. The city has a moderate climate, with a mean annual temperature of 49°F. and an average rainfall of 37 inches.

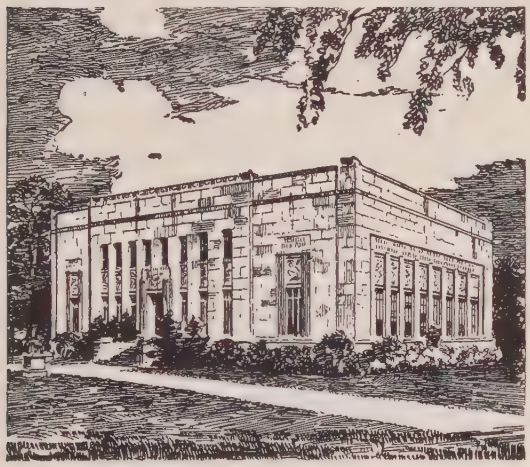
Predominantly a coal-mining center for many years, Scranton recently has developed a wide variety of new manufacturing industries. Transportation facilities are excellent. Railroads serving the city are the Central of New Jersey; the Delaware and Hudson; the Delaware, Lackawanna, and Western; the Erie; the New York, Ontario, and Western; and the Lackawanna and Wyoming Valley (electric) lines. There is an airport six miles to the southeast.

Commerce and Industry.—Scranton is the fourth largest city of Pennsylvania and a major commercial and industrial center. In addition to coal-mining operations there are extensive manufactures of carbon products, clothing, electric appliances, machinery, furniture, heating equipment, plastics, railway equipment, steel, textiles, tobacco, and paper.

Government.—The municipal government of Scranton is by a mayor and councilmen. The

Commonwealth of Pennsylvania maintains here a branch of the Superior Court, an oral school, a hospital, and other agencies. There are several agencies of the United States government located here.

Education.—Educational and cultural facilities of the city embrace a modern public school system; private and parochial schools; the Johnson Manual Training School; the Pennsylvania State Oral School for the Deaf; the University of Scranton (Catholic) for men; Marywood College (also Catholic) for women; the Scranton-Keystone Junior College; a public library with several branches; the Everhart Museum of Natural History, Science, and Art; extension schools of the University of Pennsylvania, Temple University, and Pennsylvania State College; and the library of the Lackawanna County Historical Society. The Scranton Orchestra Association, the Scranton Philharmonic Orchestra, the Community Concert Association, and the Scranton Opera Guild also contribute much to the cultural life of the community. Scranton is



Everhart Museum in Scranton, Pa.

the home of the International Correspondence Schools.

Parks and Recreational Facilities.—The city has a number of parks, playgrounds, and recreational centers. In the 145-acre Nay Aug Park are Roaring Brook, Nay Aug Falls, Lake Lincoln (now a swimming pool), the city zoo, the Everhart Museum, and various memorials, as well as playgrounds and other recreational facilities.

Notable Buildings.—Many attractive buildings adorn the city. Public buildings of note include the city hall, the county courthouse, the public library, several handsome, modern public school buildings, the Scranton State Hospital, the Everhart Museum, the United States Post Office and Courthouse, the Watres Armory, and Valley View Terrace, a government-sponsored housing project. Among the private edifices are many handsome residences, modern commercial buildings, churches, several attractive academic buildings, and the Masonic Temple and Scottish Rite Cathedral, whose auditorium has a seating capacity of 1,800.

History.—The site of Scranton was first settled about 1786 by Philip and James Abbott, brothers, originally from Connecticut, who came here, built a log cabin, and established a sawmill. About a decade later Ebenezer and Benjamin Slocum were attracted to the site, where they acquired land and operated a forge and distillery, naming the settlement Unionville, which was changed in 1816 to Slocum Hollow. In 1840 George Whitfield Scranton (q.v.), his brother Selden T., and others acquired a tract of land in the Lackawanna Valley for its coal and iron, and established at Slocum Hollow an iron forge. Here in the same year the Scrantons founded as Scrantonia (simplified in 1851 to Scranton) the city which bears their name. Later the firm of Scranton and Platt was formed, which operated here a rail mill. Out of this firm grew in 1853 the Lackawanna Iron and Coal Company. The arrival of the Delaware, Lackawanna, and Western Railroad in 1853, giving an outlet to the coal and iron of the vicinity, resulted in the rapid growth of Scranton, whose population rose to 9,223 by 1860, and 35,092 by 1870. Scranton was incorporated as a town in 1856, and as a city in 1866, at which time it absorbed the boroughs of Hyde Park and Providence, and the township of Providence. Pop. (1940) 140,404; (1950) 125,536.

Consult: Hitchcock, Frederick L., *History of Scranton and its People* (1914); Merrifield, Edward, *The Founders of Scranton* (1916).

SCREAMERS, the name given to two or three genera of birds, forming the family Palamedeidae. In the genus *Palamedea* the nostrils are oval, the head possesses a slender frontal horn more than three inches long; the wings each bear two sharp shoulder spines with bony cores, and the long toes are covered with square scales above. To this genus belongs the horned screamer (*P. cornuta*), of the Amazon Valley and Guiana, which inhabits hot morasses and swamps. This bird equals a turkey in size. The voice is shrill and loud and the birds scream in concert. The plumage is a blackish-brown above, the head and neck having the feathers marked with white.

The genus *Chauna,* of which the chaja or crested screamer (*C. cristata*) is the representative, has the tip of the bill hooked. No horn exists on the head. The name "chaja" is given to this species from the sound of its cry. It occurs in Brazil and Paraguay. It is of solitary habits. The wings possess, as in the former case, two spurs each. The color is a bluish-gray marked with black, the neck being encircled by a black collar, while a tuft of feathers on the head constitutes a crest. Round the eyes the skin is naked and of a red color. The food consists chiefly of plants and the flight is strong. The eggs are two in number.

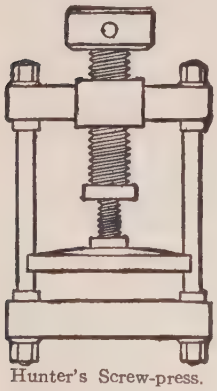
A third form (*Ischyromis derbiana*), closely related to the last, inhabits Central America. A remarkable feature of all of these birds is the great development of subcutaneous air sacs, like a thick layer of bubbles beneath the skin, which make a crackling sound when pressed. Although galline in appearance and general habits, these birds are more closely related to the ducks and geese.

Consult Evans, A. H., "Birds" in *Cambridge Natural History,* vol. 9 (New York 1900).

SCREEN, in ecclesiastical architecture, a partition of stone, wood or metal to separate different parts of the building; as, the nave or an aisle from the choir, or a private chapel from

the transept. The term is also applied to a partition extending across the lower end of a mediæval hall, forming a lobby within the main entrance doors, and having often a gallery above; also to a decorated wall enclosing a courtyard in front of a building.

SCREW, a wooden or metal cylinder having a spiral ridge (the thread) winding round it in a uniform manner, so that the successive turns are all exactly the same distance from each other, and a corresponding spiral groove is produced; also a reversed mechanism, in which the interior of a cylinder in a cylindrical hole or nut is provided with a corresponding uniform spiraled groove or thread, into which a screw (as first defined) may fit. For differentiation the primary screw is termed a male screw, and the secondary form a female screw. The male and female screw in combination form one of the six mechanical powers, being simply a modification of the inclined plane. The energy is transmitted by means of a hollow cylinder (the female screw) of approximately equal diameter with the solid one (the male screw). Hence the one will work within the other, and by turning the convex cylinder, while the other remains fixed, the former will pass through the latter, and will advance every revolution through a space equal to the distance between two contiguous turns of the thread. As the screw is a modification of the inclined plane it is not difficult to estimate the mechanical advantage obtained by it. If we suppose the power to be applied to the circumference of the screw, and to act in a direction at right angles to the radius of the cylinder, and parallel to the base of the inclined plane by which the screw is supposed to be formed, then the power will be to the resistance as the distance between two contiguous threads to the circumference of the cylinder. But as in practice the screw is combined with the lever, and the power applied to the extremity of the lever, the law becomes: The power is to the resistance as the distance between two contiguous threads to the circumference described by the power. Hence the mechanical effect of the screw is increased by lessening the distance between the threads or making them finer, or by lengthening the lever to which the power is applied. The law, however, is greatly modified by the tremendous friction induced. The uses of the screw are various. It is an invaluable contrivance for fine adjustments such as are required in fine telescopes, microscopes, micrometers, etc. It is used for the application of great pressure as in the screw-jack and screw-press; as a borer in the gimlet; and in the ordinary screw-nail we have it employed for fastening separate pieces of material together. The *differential screw*, or *Hunter's screw*, is formed of two screws, a larger and a smaller, the former being screwed internally to allow the latter to screw into it; the pitch of the two screws differs slightly, and for each turn of the chief or larger screw the progress of the point of the compound screw is the difference of pitch. Great power is in this way attained without the weakness due to a screw with fine threads. Screws for working in wood are commonly tapered, coming to a point; while machine-screws for use in metal are cylindrical and commonly flat or dull-pointed on the forward end. Exceptions are the set-screw, which has a sharp circular ridge on the forward end, to give it a bite or set when screwed down hard; and screws that are pointed or squared for some special purpose. Machine-screws were originally made by hand, a blank being forged on the anvil, and the thread being cut on a lathe or even with a file. Under this primitive system no two screws were alike, and when a screw had to be replaced it was difficult to make another that would fit. Henry Maudsley, of England, about the opening of the 19th century, gave great study to the production of uniform and accurate screws, laying the foundation for modern interchangeable machine-screws. He was followed by Sir Joseph Whitworth, who established the primary system of uniform threads subsequently accepted by leading machine-builders all over the world. Later, the Sellers standard was adopted in America and largely followed. The chief difficulty was the attaining of accurate and uniform pitch or spacing of the screw-threads, because any error was multiplied. For instance, an error of one ten-thousandth of an inch in a space between screw-threads, which would ordinarily pass unnoticed if there were only half a dozen turns, would increase with the length of the screw and number of threads, so that with 24 threads to the inch, a screw a foot long would multiply that error by 288, so that the screw would bind and jam before it would go far into its counterpart. It was found, in cutting a thread, that the very heating of the bar of metal and of the cutting tools, by their own friction, caused a variation in the threads, because of the expansion of metal under heat. But by ingenious means such errors have been compensated, and screws are now turned out very cheaply with great accuracy.


Hunter's Screw-press.

To cut a screw-thread by hand, the blank or bit of stamped metal, or a metal rod of the desired diameter, is mounted between the centres of a lathe, while a cutting tool is fixed on the slide-rest, and forced against the rotating blank, the slide-rest having a positive lateral rate of movement, so that a spiral is cut in the blank, the form of such spiral being determined by the ratio of the speed of rotation of the blank to the lateral movement of the cutting tool. This process is repeated until the thread is sufficiently deep, and it matches a master screw, which is placed beside it to test its accuracy. Another method is to use a screw-die and die-stock, which carries a pair of hardened steel cutting dies of the desired standard. These dies are placed straddle of the rod or blank, and being fixed in the die-stock, either the work or the stock is rotated until the thread is cut, the dies being pressed together gradually by a screw in the stock. Similarly a female thread may be formed with a screw-tap worked into a hole with a wrench. But in modern screw-making only the above principles are followed, screws being made on lathes specially

designed to work automatically and cut a large number of accurate screws at one operation. These machines are so thoroughly automatic, that an attendant can watch several of them, so that vast numbers of small screws can be turned out at surprisingly small cost, when their almost perfect accuracy is considered. By employing what are termed "change-wheels" on the heads of the lathes, the number of screw-threads may be altered from one standard size to another. A common principle used in screw-cutting is to employ a master-screw, or hardened screw known to be of accurate standard, as a guide for the cutting of duplicates. This master-screw carries a nut, which travels and directs the movement of the blank or bar that is being threaded. The heads of screws may be formed — (a) by upsetting or thickening the blank before cutting; or (b) by using a bar of the diameter of the head, and milling away the superfluous metal. In modern practice a milling cutter is often employed in making screws on a special machine which is half lathe and half miller. The milling cutter is mounted on a swiveling device for forming various angles in the thread. This method is well suited to forming screws that are of alloyed metal, where the cutting speed must be made suitable to the alloy. It is not adapted to very small screws, but is admirable for cutting worms or other very broad threads.

The familiar types of screw are named from the thing to which they are attached, as bench-screw, a coarse screw on a carpenter's bench for clamping the work; from the form or shape of the head, as square, hexagonal, round, conical, countersunk screw, etc.; from the character of the thread, as standard V, double (having two parallel threads running together), triple, etc. A winged or thumbscrew has a flat head that may be turned with the thumb and fingers; the Archimedian screw is a spiraled trough or tube which when laid at an angle of about 35 degrees, with the lower end in water, can be made to raise the water by turning; the differential screw has two different threads on one solid body, so that its ultimate motion is the difference between the pitch of the two threads; flat-screw, a spiral on the face of a disc, as a Victor record; interrupted screw, one having grooves cut longitudinally with threads like a tap; screw-coupling, a pipe coupling or metal collar with interior or female threads for joining pipes or round rods; screw-dog, a lathe-dog having a screw for gripping the work; screw-eye, a screw having a loop or eye for a head — when made with a hook it is a screw-hook; screw-plate, the holder of a die-stock; screw-press, a press in which the power is applied by a screw, as the primitive form of printing press; screw-rod, a rod having a screw-thread cut on one or both ends; screw-wrench, any wrench whose jaw is moved by a screw; tractor-screw, the screw-propellor of an aeroplane when placed in front as a tractor.

In 1929 there were 254 establishments devoted to the manufacture of machine-screw products and wood screws. The number of employees (average for the year) was 18,749, and the wages paid were $26,802,152. The cost of materials was $37,751,098. The value of products of the machine-screw manufacturers was $73,540,131, and of the wood screw, $9,726,556. Probably this is less than half the production of the entire country, as very many machine manufacturers make their own screws.

CHARLES H. COCHRANE,
Author of 'Modern Industrial Progress.'

SCREW-PINE, a popular name for species of *Pandanus,* order *Pandanaceæ.* The species of which more than 50 have been described, are natives of the tropics, and are especially numerous in the Australasian Archipelago. They are mostly trees or shrubs with slender or stout trunks, frequently with aerial roots. Each naked branch is terminated by a tuft of long sword-shaped spiny-edged leaves. In tropical countries *P. utilis* is highly valued for its edible fruits, and the fibres of its roots and leaves. The leaves of *P. odoratissimus* also yield a valuable fibre (q.v.). The former species, which has green leaves, and *P. veitchii,* which has variegated foliage, are widely popular in greenhouses, being easy to rear, fairly rapid in growth, and striking in appearance. The name screw-pine is suggested by the perfect spiral arrangement of the leaves easily observed in mature specimens, and also from their resemblance to the pineapple.

SCREW PROPELLER, a mechanical device embodying the principle of the screw, employed in the propulsion of various kinds of marine craft — ocean steamships, warships, tugboats, yachts, motor-boats, etc.— and all forms of aircraft. Only the marine form will be treated here: for the air propeller see AEROPLANE — CONSTRUCTIONAL FEATURES.

The marine propeller consists of a cylindrical or spherical hub or boss to which two or more blades are attached with bolts, and forms the screw which acts in the water somewhat like a screw bolt in a nut and the rapid rotation of which around its axis pushes the vessel forward.

It is the accepted modern method of ship propulsion and although known to waste at least 40 per cent of the power delivered to it by the driving engines, it has almost completely superseded the paddlewheel and confined the application of the latter to river steamers and other light draft craft.

Although known in principle to the ancients, and suggested in France by Bernouille in 1752, by Edward Shorter in 1800, and by Dallery in 1803, the credit for its modern reinvention and practical application appears to belong to Ressel, the Austrian inventor, who took out a patent for it in 1812 and used it practically on the steamer *Civetta,* in 1829. The idea was further developed by Sauvage in 1832, and a few years later, in England, by Smith and Ericsson. Smith's modification — the reduction in the number of blades, was suggested by an accident which broke off one of the six blades in his propeller, resulting in a decidedly accelerated motion of the vessel.

In America, Evans and Fitch experimented with screw propellers in 1780 and 1790, and Stevens successfully operated a steamboat equipped with a screw propeller, in 1802, but it was most practically developed and applied by Ericsson in 1839, in connection with the United States steamer *Princeton* which was the first screw-propelled war vessel ever built in any country. She was built through the recommendation of Commodore Stockton, under

Ericsson's personal superintendence. She had a tonnage of about a thousand tons, and was the first war vessel in which the machinery was entirely below the water-line, and her unqualified success not only demonstrated the particular value of the screw for vessels of war, but quickly led to its general application to those of the merchant service as well, before the close of the year 1870.

Each blade of a screw propeller may be considered as the small portion of a complete screw-thread of great pitch, and considerable depth relative to the pitch. The pitch of a propeller is the distance through which a point on the tip of one of the blades would move — in one revolution, assuming the water in which it turns to be a solid medium. As the water is not solid, but gives way as soon as its low degree of inertia is overcome, the shape given to the blade is not that of the true helical screw, but is so modified as to give it the firmest possible grip on the yielding water. There are two general types — (1) those in which the blades are plain warped surfaces, and the pitch is constant at all points, that is, the generating line of every blade keeps the same angle with the boss, and (2) those in which the blades are curved and bent in various ways, and the pitch is variable at different parts of the blades. Many different screws of this type, with variable or increasing pitch, have been designed in the attempt to produce a form that would reduce to a minimum the loss of applied power due to the rotary motion of the screw which forces the water away radially and the loss due to the friction of the blades. In the earlier forms, in which the boss was of small diameter — about twice that of the shaft — the increasing angle of the blade surfaces, as they approached the axis, placed them at the boss in a position parallel to the keel, so that the central portion of the screw gave very little propulsive efficiency — a great deal of the power being used up merely in churning and agitating the water. Another cause that wasted a great deal of energy was the number and length of the blades, and their great width at the ends, all of which absorbed power by surface friction.

To obviate these faults, Griffiths substituted for the central portion a large spherical boss, one-third the diameter of the whole propeller, which revolved smoothly in the water. He also diminished the width of the blades, and attached them to the boss in such a manner that they could be turned upon their axes and thus given various inclinations according to the speed intended for the ship. In the latest types of propellers, the diameter of the boss varies from one-fifth to one-third of that of the whole screw; while the diameter of the whole screw depends upon the speed required, the character of the driving machinery, the form of the ship, and many other conditions for which only approximate rules can be given. It is interesting and valuable to note in this connection, that upon the basis of the data derived from the actual tests of a great variety of screw propellers it is safe to state that the exact effect due to the form of their blades has not as yet been definitely determined, and that the shape of the hull of the vessel is by far the chief controlling factor in determining the question of speed. Another factor which adds greatly to the loss of applied power is the «slip» resulting from the working of the screw in a yielding or fluid medium and, therefore, requiring a greater number of revolutions to travel a given distance than would be required if it worked in a solid medium. Slip is a factor which adds greatly to the waste of applied power in all forms of propellers — sails, oars, paddlewheels, etc. In the case of the screw propeller, the difference between the distance traveled by the screw in a fluid, and the interval of its advance in a solid medium is known as the «apparent slip»; while the backward velocity given to the water immediately acted upon by the screw, is called the «real slip.» Both of these results are consequences necessitated by the working of a screw in a fluid medium, and may under certain circumstances vary considerably from each other. «Negative slip» is a term used to denote the actual speed of a ship above its calculated speed, very often attained by a change of the size or form of the propellor. Real slip may be expressed by the formula $\frac{v+f-s}{v}$, in which (v) represents the speed of the screw, (s) the speed of the vessel, and (f) the velocity of the forward motion of the water following in the wake of the vessel. The factor (f), being due to the frictional resistance of the vessel, depends so much upon the shape of its hull, that it is not susceptible of accurate determination, so that in considering the loss of applied power in this connection, the result ordinarily referred to is the apparent slip.

The speed of propeller is expressed by multiplying the number of its revolutions per minute by its pitch. This expression gives the theoretical speed per minute. The slip being subtracted from this gives the actual or effective speed. If the vessel were moored to a dock while the screw was running, the entire speed would be nullified by the slip.

The efficiency of different forms of propellers differs but slightly so long as their pitch, and their blade areas are designed correctly to suit the conditions for which they are employed. In general three-bladed propellers are the most efficient and are freer from vibrations than the other forms. As previously stated, however, the most important element affecting the propulsive efficiency of a screw propeller is the form of the vessel. For low speeds, bluff bows and full sterns gives results equally as good as sharp bows and lean sterns with a long hollow run; while on the other hand the last-named qualifications give a form that allows the waves of replacement to flow in solidly to the propeller, and is the most appropriate for high speeds. In general it may be said that the problem of the most efficient propeller for any given ship depends upon the speed at which the ship is intended to be driven. This being decided, the hull must be modeled in such lines that the water pushed to either side by the passage of the vessel shall have ample time and room to come solidly together again before the propeller begins to work in it. Hence, the slower the speed the fuller the stern may be modeled; and the higher the speed, the finer the lines of the stern approaching the propeller. Upon the

modeling of the hull, therefore, depends the speed of the engines. If the propeller is turned too fast for the possible speed of the model through the water it will simply churn the water (in part) to foam, at a great loss of efficiency. So that the number of revolutions of the screw per minute is actually determined by the shape of the hull, and its consequent resistance to motion through water. A slow moving screw may have narrower and longer blades, thus reducing the friction of the blade surfaces on the water, and in this way making for efficiency of the power delivered by the engine. And a slow moving screw may also have a greater pitch than a fast running screw, and this also tends to increase efficiency. The most satisfactory slow propellers (those on merchant ships) have a pitch of 1.2 to 1.5 times the diameter of the screw. On the contrary, the fast screws on passenger ships and war vessels, particularly those run by turbine engines, have a pitch of less than their diameter, and broad squat blades. Broadening the tip of the propeller blade increases the thrust, but slows down its speed. Conversely, the slow engine admits of a propeller of larger diameter, and with wider tips; and the efficiency of engines is greater at moderate speeds. So that the problem of the propeller depends upon the skilful balancing of many requirements and each must be given its weight in the compromise to achieve the best possible result.

Figs. 1 to 8 show a few of the 150 forms of screw propellers, designed at different periods, and illustrate in a general way its development from the primitive form designed by Ressel in 1812. All of those used at the present time,

FIG. 1.—Ressel-1812.

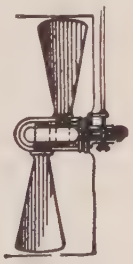


FIG. 2.—Ressel-improved.

however, are modifications of the Griffiths, Thornycroft, and Jarrow types. The Hirsch propeller has not come into general use for shipping, although in all trials it has shown an

FIG. 3.
Ericsson — 1835.

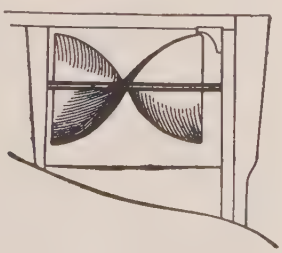


FIG. 4.
Maudslay — 1848.

efficiency from 3 to 8 per cent higher than the other types. It has, however, been largely adopted for motor-boats and small yachts and speed boats, and there are numerous modifications of it under various trade names. The so-called «weedless» propellers are on Hirsch lines.

Propellers are built of iron, steel or bronze. The last named is the preferred material and while there are as many formulas as there are

FIG. 5.
Hirsch — 1860.

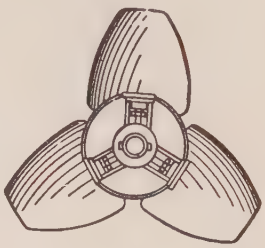


FIG. 6.
Griffiths — 1865.

manufacturers, they may be classified generally under four groups: (1) Admiralty bronze, with a composition of about 87 per cent copper; 8 per cent tin; 5 per cent zinc; and with a strength of 15 tons to the square inch; (2)

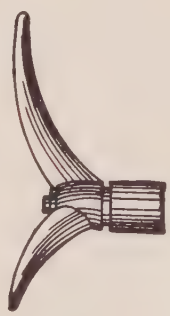


FIG. 7.
Jarrow — 1880.

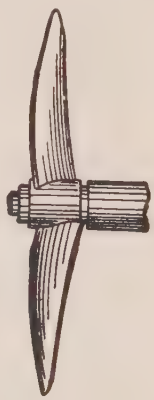


FIG. 8
Thornycroft — 1885.

phosphor bronze, 82.2 per cent copper; 12.95 per cent tin; 4.28 per cent lead; 0.52 per cent phosphorus; and with a strength of 17 tons per square inch; (3) aluminum bronze, 95 per cent copper and 5 per cent aluminum; with a strength of 25 tons per square inch; and (4) manganese bronze, of secret composition, except that it contains both copper and zinc, and has a strength of 30 tons per square inch. The cast iron or cast steel propellers of the slow-going merchant ships have a strength of from 10 to 20 tons per square inch. This would not be safe for a fast running propeller. The blades are cast solid with the boss, or made separate and bolted or attached to it in various ways. For small boats a reversible propeller is made in such fashion that the pitch of the blades may be altered from right-hand to left-hand by moving a lever working through a hollow propeller shaft, thus reversing the direction of the thrust without reversing the engine. A screw propeller when in position is secured to the end of the shaft of bronze or steel called the propeller or tail shaft, which is connected to the line shafting attached to the crank shaft of the driving engine. The push

or thrust of the screw, which is equivalent to the resistance of the hull, and amounts to about 20,000 pounds per 1,000 horse power, is received on a thrust bearing provided with a series of collars and grooves which fit similar ones on the shaft. Small vessels, and those designed for slow speed, are usually equipped with single screws; but for large high speed vessels, twin screws placed horizontally at right angles to the keel, one on each side of the stern post, are the most efficient. Some vessels have been fitted with three screws, but the amount of additional efficiency derived from the arrangement is a very doubtful quantity. On the other hand, high-powered vessels equipped with turbine engines employ multiple screws, the engines operating two, three or more shafts, with the advantage of dividing the work of generating the enormous power required by large modern ships among several small engines instead of one large ponderous machine, thus reducing to a minimum the difficulties and dangers incident to breakdowns. Sailing vessels using steam only as an auxiliary power are equipped with «feathering» screws, the blades of which can be closed together in a line parallel with the keel, and thus prevent them from acting as a drag when the vessel is propelled by the sails alone.

Fig. 9 shows the stern of the United States cruiser *New York* with twin screws in position.

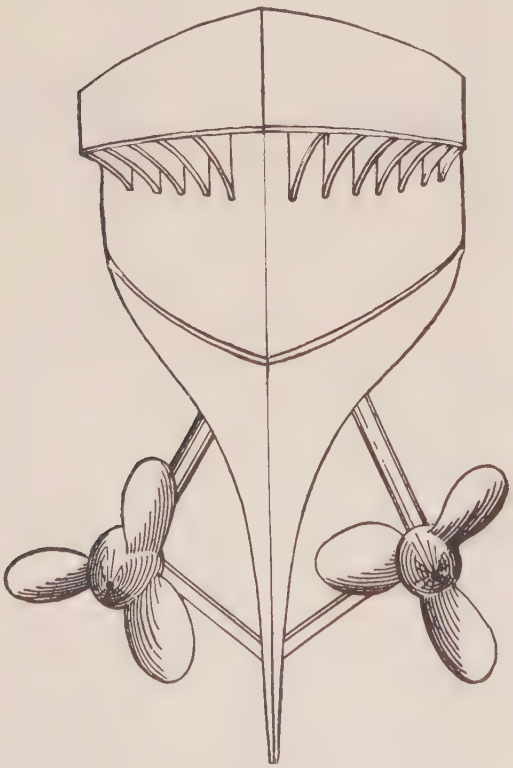


Fig. 9.—Twin Propellers, U. S. S. *New York*.

Bibliography.— Baker, G. S., 'Ship Form, Resistance and Screw Propulsion' (New York 1915); Dyson, C. W., 'Screw Propellers and Estimation of Power for Propulsion of Ships' (New York 1913); Peabody, C. H., 'Propellers' (New York 1912); Seaton, A. E., 'The Screw Propeller and Other Competing Instruments of Marine Propulsion' (London 1909).

SCREW-WORM FLY, one of the fleshflies (q.v.) most troublesome to domestic animals in the southwestern United States. It lays its eggs in wounds, and the twisted larvæ feed and move in the flesh, making a bad sore.

SCRIABIN, skrĭ'ä-bēn, **Alexander,** Russian composer: b. Moscow, 10 Jan. 1872; d. there, 1915. In early life he was trained for a military career, but entered the Moscow Conservatory where he studied piano under Safonov and composition with Taneiev. In 1892 he won the gold medal for piano playing and during European tours achieved fame as a virtuoso. During 1898–1903 he was professor in the Moscow Conservatory, then resigned and devoted his energies to composition. Chopinesque yet original, his early piano pieces are marked by fervid spirituality, which led him after 1900 to formulate a synchronous theory of music, color and perfume which he sought to prove by means of his «color keyboard,» and his symphonic work 'Prometheus or Poem of Fire.' His other works include a piano concerto and four symphonies.

SCRIBE, skrēb, **Augustin Eugène,** French dramatist: b. Paris, 24 Dec. 1791; d. there, 20 Feb. 1861. He was originally intended for the legal profession, but early abandoned it for the more congenial occupation of a writer for the stage, in which after a careful study of the public taste his success was very decided. His first piece was 'Les dervis,' written in conjunction with his friend Germain Delavigne, and produced in 1811. Scribe's dramatic pieces comprise all the departments of the lighter kind of drama, and from their gaiety and interest of plot, as well as the felicitous manner in which modern French life is depicted, have acquired a universal popularity in Europe, and have also been introduced on the English stage in translations. Among his vaudevilles may be mentioned 'Le comte Ory,' 'Le nouveau pourceaugnac' and 'Une visite à Bedlam.' He wrote for the Odéon, the Porte Saint Martin, and the Variétés theatres, but more especially for the Gymnase Dramatique, to which he furnished 'La maîtresse du logis'; 'Malvina ou un mariage d'inclination'; 'Le mariage de raison'; 'Geneviève, ou la jalousie paternelle'; 'Maître Jean, ou la comédie à la cour'; 'L'Amitié, ou les trois epoques'; 'Héloise et Abélard'; and numerous other pieces. To the Théâtre Français he contributed 'Bertrand et Raton' (1833); 'Le verre d'eau' (1840); 'Adrienne Lecouvreur' (1849) and 'Les contes de la reine de Navarre' (1850). In collaboration with Legouvé he wrote 'Bataille des dames' (1851) and 'Les doigts de fée' (1858). As a writer of opera librettos Scribe is also deservedly famous, having supplied composers with the text of the most celebrated of those produced at the Grand Opera and Opera Comique. Of these mention may be made of 'La dame blanche' (1825); 'Fra Diavolo' (1830); 'Robert le Diable (1831); 'La juive' (1835); 'Les huguenots' (1836); 'Les diamants de la couronne': 'Les martyrs' and 'Le prophète' (1849). From the multiplicity of works with which he was engaged, Scribe, like other French authors, availed himself largely of the assistance of collaborateurs, and much,

therefore, which bears his name was in reality only subjected to his revision and superintendence. In 1836 he was admitted a member of the French Academy.

SCRIBE, The, an early Egyptian statue now in the Louvre Museum, Paris. Colored red, and with inlaid eyes of crystal, it is regarded as one of the most characteristic illustrations of the art of the fifth dynasty.

SCRIBES, Jewish. Originally nothing more than copyists of the law, a business which they followed as a means of livelihood, the Jewish scribes gradually increased the importance of their position until, after the dissolution of the commonwealth, they became the vital force which determined the later form of Judaism. The importance of their office as doctors of the law and interpreters of the Scriptures is shown in many passages in the Old and New Testament. During this rise in the influence of the Jewish doctors they were known by five distinct appellations: (1) the Sopherim, or «Scribes.» who guarded the Bible against corruption and who read the law; (2) the Tanaim, or teachers of the law; (3) the Amoraim, or doctors of the law; (4) the Saboraim, or teachers of the law after the conclusion of the Talmud; (5) the Gaonin, or last doctors of the law in the chain of rabbinic succession, the latter title being applied to the presidents of the colleges, which when assembled together explained difficult points in the Talmud, discussed and answered all ritual questions and enacted new laws for the regulation of the dispersed congregations.

SCRIBLERUS CLUB, The, a club organized by Swift in 1714. An association of writers, its object was the suppression of exhibitions of literary incompetence by means of satire. Pope, Gay, Bolingbroke and other authors of that day were prominent as members.

SCRIBNER, skrĭb'nẽr, **Charles**, American publisher: b. New York, 21 Feb. 1821; d. Lucerne, Switzerland, 26 Aug. 1871. He was graduated from Princeton in 1840, and in 1846 established with Isaac D. Baker the publishing house of Baker and Scribner, which after the death of his partner in 1850 became known as that of Charles Scribner and Company. *Scribner's Magazine*, founded by this firm in 1870, was purchased by other publishers and became the *Century Magazine* in 1881. A new *Scribner's Magazine* was established by the firm, known since the death of its founder as Charles Scribner's Sons, in 1887.

SCRIBNER, Frank Kimball, American author: b. New York, 22 Feb. 1866. He was graduated from Williams College in 1890, studied at Harvard Law School, engaged in literary work since 1903 and was for four years on staff of the New York *Sun*. He has contributed articles to current publications and has had published series of hunting and fishing stories, 'The Honor of a Princess' (1897); 'The Love of the Princess Alice' (1898); 'The Fifth of November' (1898); 'A Continental Cavalier' (1900); 'The Red Lion'; 'The Ravens of the Rhine'; 'The Secret of Frontellac.' He is a member of the Author's League of America, the Williams Club, the National Geographic Society, American Forestry Association and the Social Science Club.

SCRIBNER, Frank Lamson. See LAMSON-SCRIBNER.

SCRIP, *in commerce*, a term commonly used for a certificate of loans or shares in a joint-stock company, whether as a temporary acknowledgment or the permanent voucher of the holder's interest. Script may accordingly be either transferable or not transferable. The valid transfer of interest may be effected only by registration in the books of the company, or the transfer of the scrip itself may be held to represent a valid transfer of interest. *In heraldry*, a bearing representing a pouch or almoner. The word also means a scrap of paper or parchment usually with some writing on it, and during and after the Civil War in America was applied to the fractional paper money issued by the government of the United States.

SCRIPTURE, skrĭp'tūr, **Edward Wheeler**, American psychologist: b. Mason, N. H., 21 May 1864. He was graduated from the College of the City of New York in 1884. After pursuing his psychological investigations at the universities of Berlin, Leipzig and Zürich, he was called to Yale, where he became director of the psychological laboratory in 1898. In 1902 he became assistant professor of psychology there and four years later was made lecturer at Johns Hopkins. In 1909 he became lecturer on psychiatry at Columbia. Later he became professor of experimental phonetics in the University of Vienna. He was the discoverer of a method of measuring hallucinations and processes of imagination, and the originator of a method of producing insensibility by means of electricity. He was also the discoverer of the law of the «mediate association of ideas.» His writings include 'Thinking, Feeling and Doing' (1897; 2d ed., 1907); 'The New Psychology' (1898; 2d ed., 1905); 'The Elements of Experimental Phonetics' (1902); 'Researches in Experimental Phonetics' (1906); 'Study of English Speech by New Methods of Phonetic Investigation' (New York 1923); 'Stuttering, Lisping and Correction of the Speech of the Deaf' (New York 1923).

SCRIVENER, skrĭv'nẽr, **Frederick Henry Ambrose**, English Biblical scholar: b. Bermondsey, London, 29 Sept. 1813; d. Hendon, 26 Oct. 1891. He was educated at Trinity College, Cambridge, and from 1846 to 1856 was headmaster of Falmouth School and incumbent of Penwerris, retaining this living till in 1862 he was presented to the rectory of Gerrans, Cornwall. In 1870 he was appointed a member of the New Testament Revision Company, and in 1872 was granted a pension from the civil list in recognition of his services in connection with Biblical criticism. In 1875 he became vicar of Hendon, Middlesex, and prebendary of Exeter. He took high rank in the philological criticism of the New Testament, on which he published some valuable works, beginning with an edition of the Greek text in 1858, executed after collating about a score of unexamined manuscripts. His chief work was his 'Plain Introduction to the Criticism of the New Testament' (1861). He also published 'Cambridge Paragraph Bible' (1873) and 'Bezæ Codex Cantabrigiensis,' etc.

SCROFULA, a diseased state of the body characterized by usually indolent cheesy glan-

dular tumors which suppurate and imperfectly heal, leaving fistulous passages or ugly scars. It is also known as struma, scrofulosis, tuberculous adenitis and tuberculosis of the lymphatic system. It is a mild grade of tuberculous infection and should be treated as such. Sometimes internal organs, especially bones and joints, are attacked by a low grade of inflammation followed by a caseous degeneration. Scrofula was common in ancient and medieval times. It was formerly called king's evil, and for centuries was treated by the touch of the kings of England and France. Modern medicine does not recognize any disease as scrofula.

SCROGGS, skrŏgz, Sir **William,** English jurist: b. Deddington, Oxfordshire, England, about 1623; d. London, Oct. 25, 1683. His name is a synonym for judicial injustice and cruelty. He was appointed chief justice in 1678 in which office his brutal methods and infamous partiality in conducting the trial of the victims of Titus Oates' antipopish conspiracies, soon made him notorious. He was impeached by the House of Commons in 1680 but was never tried. However, in 1681 he was removed from his office by the king, who granted him a pension.

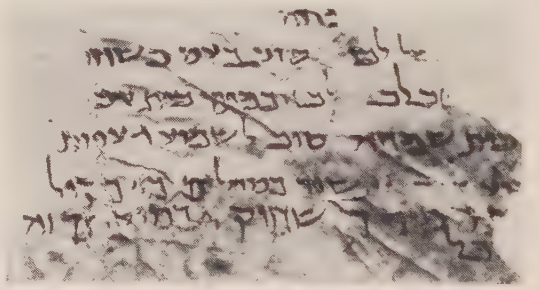
SCROLL, skrōl. The word is derived through the Middle English from the Old French *escroelle, escroele,* meaning a strip or roll; hence a roll or bundle of paper or parchment containing writing. The larger number of ancient Biblical documents were inscribed on leather, parchment, or vellum. The skins were sewn together in long strips, and after being inscribed were formed into scrolls. Compare the Hebrew Megilloth or rolls, such as the five books of Ruth, Esther, Canticle of Canticles (Song of Songs), Ecclesiastes, and Lamentation. The word scroll is also applied to a wide class of ornaments, etc., with spiral designs of various sorts, or to the flourish appended to a signature.

SCROLLS, The Dead Sea. In the spring of 1947 a member of the Ta'amireh tribe of Bedouins discovered a number of ancient scrolls in a cave in the cliffs west of the Dead Sea, some seven miles south of modern Jericho.

The 11 scrolls represent seven independent works. The first of these is a complete Book of Isaiah, containing 54 columns. The orthography is notable for its profuse use of the vowel letters. While there are a number of variants, some of which agree with the Septuagint and other versions, the most striking feature of the scroll is its close approximation to the Masoretic text. The manuscript is carelessly written, containing a number of omissions, but these have been remedied by marginal and supralinear insertions. The complete text, together with that of the Habakkuk commentary, mentioned below, was published in 1950 by the American Schools of Oriental Research, and edited by Millar Burrows of Yale University (*The Dead Sea Scrolls of St. Mark's Monastery,* vol. 1). It gives a facsimile of each column together with the transcription of the Hebrew on the opposite page.

The second work, containing 11 columns of text, is a composition of a Jewish sect and is known as the Manual of Discipline. It is the most important of the non-Biblical writings. It gives the impression of being a compilation of several originally separate documents. The life and order of the community are described in great detail. The community is dedicated to a life of obedience and service to God, "to do what is good and right before Him, as he commanded through Moses and through all his servants the prophets." The annual ceremony of entrance into the covenant is described, and the statutes and regulations governing daily conduct, especially for the meetings of the holy assembly, are given in great detail. The most characteristic words are *truth, faithfulness, holiness, perfection, knowledge, community,* and *covenant.* While the greater part of the work is legalistic, the last two or three columns, in poetic form, are confessional and devotional in character and, in striking contrast, appeal to justification through God's righteousness.

The third scroll, with a little more than 12 columns, contains a commentary of the first two chapters of the Book of Habakkuk. The writer quotes a small portion of the Biblical text, and follows it with the formula, "This means" or "Its meaning is." The commentary reflects the writer's own times; it is, therefore, the most important of the scrolls for our knowledge of the history of the period. Unfortunately the allusions are obscure. Many attempts have been made to identify "the teacher of righteousness" and "the wicked priest" or "the man of lies," but no proposed solution has yet found general support. The scroll is superbly written and obviously the work of a skilful scribe.



© Palestine Archaeological Museum

A beautifully written fragment from the Book of Ecclesiastes, dating from about the middle of the second century B.C.

The fourth scroll, originally believed to be the lost Apocalypse of Lamech and to be written in Aramaic, is now known to be a paraphrase and commentary on the Book of Genesis in Hebrew and Aramaic. These four scrolls together with those still to be discussed are deposited at the Hebrew University in Jerusalem.

Among the scrolls originally published by E. L. Sukenik of the Hebrew University the first is an incomplete Isaiah (chaps. 38-66 with parts of chap. 10 in fragments). It follows the Masoretic text much more closely than the first scroll, and therefore has special interest for the transmission and history of the text. It has been published under the title (in Hebrew) of *Library of the Hidden Scrolls,* by the Bialik Foundation in Jerusalem, together with the other books named below.

The War of the Sons of Light and the Sons of Darkness is preserved almost in its entirety. It contains 19 columns, and describes in vivid detail an eschatological war, reminding one of the conflict of Gog and Magog in the Book of Ezekiel and of the final conflict described in the

Book of Revelation. The description of the battle formations with their standards, bearing sacred legends like "The Truth of God," "The Glory of God," and "The Justice of God"; the inscribed trumpets of various military divisions, and of the military tactics and strategy, have been clarified by the study of contemporary Roman practices.

The last work, now in four separate scrolls with 12 columns of text, was originally a collection of 20 psalms, and is known as the Hodayoth or thanksgiving hymns. They not infrequently remind one of the Hebrew Psalter, but their stylistic affinities are closer to some of the psalms of the intertestamental period, such as the Psalms of Solomon, and to the nativity hymns of the Gospel of Luke.

In addition to the foregoing scrolls a substantial number of fragments have been recovered from Cave 1. These have been published in *Discoveries of the Judean Desert* by D. Barthélemy and J. T. Milik, vol. 1. Besides a number of Biblical texts, they contain fragments of commentaries on the books of Micah, Zephaniah, and Psalms; pseudepigraphical writings like Jubilees, the Testament of Levi, and a Book of Mysteries; liturgical works with a collection of benedictions, hymns, and prayers; and finally the extraordinary "Rule of the Congregation" in two columns, which opens with the words, "Now this is the order for the whole congregation of Israel in the latter days."

Date of the Scrolls.—Several independent lines of evidence converge upon a period from the 2d century B.C. to the Jewish War (66–70 A.D.), more precisely 68 A.D. Among these the more important are the paleographical, that is, the witness of the handwriting; the archaeological, especially the ceramic evidence gathered from the pottery of the caves and of Khirbet Qumrân; the witness of the coins, or numismatic evidence, which in one significant cache terminated c.68 A.D.; the historical allusions, though these are admittedly unclear; the literary relationships; the orthography, vocabulary, and syntax; the Carbon 14 test, yielding a date of 33 A.D. with a margin of plus or minus 200 years. No one of these witnesses can be said to be in itself decisive, but together they constitute a strong bulwark for an early date.

Excavations at Khirbet Qumrân.—This ancient ruin lies about a kilometer to the south of Cave 1. It has been excavated by Father Roland de Vaux, the head of the French Dominican School of St. Stephen in Jerusalem (Jordan), and G. Lankester Harding, Director of Antiquities for the Hashemite Kingdom of Jordan. It has been demonstrated that the ruin is contemporary with the writing of the scrolls. Cisterns have been exposed, some of which *may* be related to the references to ceremonial ablutions or baptisms described in the Manual of Discipline. In one room (40 feet by 12 feet) benches, desks, an ablution bowl, and two inkwells containing dry ink were discovered. This was in all probability the place where the scrolls were copied. More interesting was a large room, the place where the sacred meals were celebrated. Nearby some 1,100 bowls and other "dishes" were found, more than 600 of them unbroken. Five campaigns have thus far (1956) been carried on at Khirbet Qumrân. The results have served to supplement much of what we learn from the Manual.

Identification of the Community.—But who were the holy men who lived on the shores of the Dead Sea from the 2d century B.C. to the destruction of the community c.68 A.D.? The question is obviously one of great importance. Now the Roman historian Pliny, writing c.77 A.D., tells of "the solitary tribe of Essenes" living on "the west side of the Dead Sea," and the Jewish historian, Flavius Josephus, writing in the 1st century of the Christian era, devotes a long section of his *Wars* (II, viii, 2-14) to the Essenes. These reports are amplified by a number of references in the works of Philo of Alexandria (*Quod omnis probus liber sit; De Vita contemplativa; Hypotheteca*). There are many striking parallels between Josephus' account of the Essenes with the Manual of Discipline, and this is true also, though to a lesser degree perhaps, of Philo. While absolute certainty on the question of identification is precluded, it can be said with considerable confidence that the Qumrân sect must have been very similar to the Essenes, if, indeed, they were not the Essenes.

Discovery of the Fragments.—In the spring of 1952 announcement was made of the discovery of many more scrolls by the Ta'amireh bedu. By far the richest "find" came from Cave 4, the most impressive of all the caves, located, as it is, high up on the face of a cliff at the juncture of two wadies. This cave alone contained fragments of well over 300 separate scrolls. About one third of them are Biblical, every book in the Old Testament being represented with the exception of the Book of Esther. Deuteronomy, Isaiah, and Psalms are represented most frequently. Among the extra-Biblical writings only the following can be mentioned here: a messianic florilegium, a catena of passages from the Hexateuch and containing the crucial verse, Deuteronomy 18:18, concerning the coming prophet; fragments of the Zadokite Work, certainly the composition of the same community; fragments of an Aramaic Enoch and of a Hebrew and an Aramaic Tobit; several commentaries; and liturgical works.

Significance of the Scrolls.—(1) The Biblical scrolls antedate our earliest extant Hebrew text by about 1,000 years. This by no means suggests that the text is superior to the Masoretic text. On the contrary the latter can generally be safely maintained. But this does not dispose of the matter. Not a few of the variants in the first Isaiah scroll have a claim to be considered. Moreover, extensive fragments from I and II Samuel, representing the Hebrew prototype or Vorlage of the Septuagint, have appeared. Since the Masoretic text of these books is notoriously corrupt, and the Septuagint often gives us a superior witness, these materials are of great importance. A line fallen out of our Hebrew text of Deuteronomy 32:43, but preserved for us in Hebrews 1:6 and the Septuagint, has been recovered in a Hebrew text. Finally, it is to be observed that we now have evidence of a Masoretic tradition long before the rabbinic recension of 100 A.D., a recension which destroyed all variant textual traditions.

(2) The scrolls have importance for our knowledge of the history, literature, and religion of the intertestamental period. The Essenes (?) were, to be sure, a sectarian group, but it can no longer be doubted that they occupied a position of far greater importance than we have assumed in recent years. The question of the authorship of the books of the Apocrypha and pseudepigrapha will now have to be reconsidered. The Zadokite work was *certainly* Essene (?), and Jubilees, Enoch, the Testaments of the Twelve Patriarchs,

and the Assumption of Moses probably belong to the same group. The apocalyptic world view of the community is strongly marked, but there are other strands of thought too; that is, legalism, prophetic theology and ethics, wisdom, and mystical piety.

(3) The holy men of this ancient sect thought of themselves as "the new covenant" that is, New Testament. They went into the desert in literal fulfillment of the words of Second Isaiah (40–66), "In the wilderness prepare the way of the Lord, make straight his paths," though they interpreted this as meaning the devout study of the law, which, indeed, they pursued day and night. It is significant that the ministry of John the Baptist opens with these words in all four of our Gospels. John came baptizing in the wilderness of Judea in the region of the Jordan, in all likelihood in the very region of our holy community. The affinities between John and the Essenes (?) are so numerous and striking that some scholars have thought of him as at one time a member of the community; while this cannot be demonstrated, the possibility cannot be excluded. The question "Are you the prophet?" would have very special relevance for the sect. The rite of "baptism," the emphasis upon repentance and the Spirit, the message of judgment and doom, all this belongs to the same climate as that at Qumrân.

(4) The affinities between the Dead Sea Scrolls and the New Testament have received much attention by scholars. Most striking is the relationship of the Manual to the Gospel of John. The conflict between light and darkness and between life and death, is common to both, and John's words about the relation of the *logos* to creation in the prologue are not unlike a passage in the Manual. The Semitic character of John has been rendered more probable.

(5) The two central rites of the sect of the "new covenant" were baptism and the communion meal. The former was not an act once for all, but was practiced periodically, perhaps annually, at each celebration of the renewal of the covenant. The latter is described in a remarkable passage in the "Rule of the Community" in two columns. Here we have an eschatological celebration; the messiahs play a central role; the participants are seated according to rank at the table of communion; the presiding priest blesses the wine and the bread.

(6) In the ritual of the communion the messiahs of Aaron and Israel are mentioned, but elsewhere we read (in the Manual of Discipline) of "the coming of the prophet and the messiahs of Aaron and Israel." In the New Testament each of these titles, prophetic, priestly, and royal, are referred to Jesus, but never together. In later Christian thought the association of all three is made, however. This influence upon the early Christian community is by no means isolated. In such early Christian writings as the Didache and the Epistle of Barnabas, we encounter a number of striking parallels to the Dead Sea Scrolls, more especially in the section on the Two Ways.

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JAMES MUILENBURG,
Union Theological Seminary, New York City.

SCROOGE, Ebenezer, the leading character in Dickens' *Christmas Carol* (q.v.) and employer of Bob Cratchit, a poor clerk. Scrooge, "a squeezing, grasping, covetous old hunks, sharp and hard as flint," has visions of Christmases past, present, and to come. They have a miraculous effect on his nature, making him benevolent, cheerful, loving, and by all beloved.

SCROPHULARIACEAE. See FIGWORTS.

SCRUBBIRD, skrŭb'bûrd, any bird living in or frequenting bush or scrub; specifically a small bird of the abnormal passerine genus *Atrichornis* inhabiting bushy scrub in Australia.

SCUDDER, skŭd'ĕr, **Horace Elisha,** American author: b. Boston, Mass., Oct. 16, 1838; d. Cambridge, Jan. 11, 1902. He was graduated from Williams College in 1858, engaged as a teacher in New York for three years, and in 1867–1870 he edited *The Riverside Magazine for Young People.* He then entered business life, but soon withdrew to devote himself entirely to literature. His juvenile publications, which were widely popular, include *Seven Little People and their Friends* (1862); *The Bodley Books* (1875–1887); *The Book of Legends Told over Again* (1899). His work was not, however, confined to juvenile literature. He edited the *Atlantic Monthly* in 1890–1898, and contributed much to it, though usually anonymously; edited *The American Commonwealth Series; American Poems* (1879); *American Prose* (1880); and wrote *Life and Letters of David Coit Scudder, a Missionary in India* (1864); *Noah Webster, a Biography* (1882); *Men and Letters* (1887); *James Russell Lowell, a Biography* (1901).

SCUDDER, Janet, American sculptor and painter: b. Terre Haute, Ind., Oct. 27, 1873; d. New York, N. Y., June 9, 1940. She was educated at the Cincinnati Art Academy, the Art Institute, Chicago, and at the academies of Vittis and Colarossi in Paris, and at MacMonnie's Studio there. She lived abroad most of her life. She was awarded medals at the expositions at Chicago 1893; St. Louis 1904; Paris 1911 (honorable mention); San Francisco 1915; and Amsterdam 1928. She was made chevalier of the Legion of Honor in 1925. Her works include *The Frog Fountain* (Metropolitan Museum, New York City); *Young Diana* and *Little Lady of the Sea* (Paris Salon); *Fighting Boys Fountain* (Art Institute of Chicago); and others at the Luxembourg, Congressional Library, and Peabody Institute. She wrote *Modeling My Life* (1925).

SCUDDER, John Milton, American eclectic physician: b. Harrison, Ohio, Sept. 8, 1829; d. Daytona, Fla., Feb. 17, 1894. He was educated at Miami University, Oxford, Ohio, and was graduated in medicine at the Eclectic Medical Institute of Cincinnati, Ohio, in 1856. In 1857 he was appointed demonstrator of anatomy and served as professor of obstetrics and diseases of women in his alma mater, 1858–1860. From 1860 to 1887 he filled the chair of pathology and practice of medicine, and from 1887 to his death the chair of hygiene, principles of medicine, physical and specific diagnosis. In 1869 he published the doctrine of specific medication, originated by him, and since that time the basis of practice of the eclectic school of

medicine. For 32 years he was editor of the *Eclectic Medical Journal*, the oldest periodical devoted to American eclectic medicine. He wrote 'Practical Treatise on Diseases of Women' (1858); 'Eclectic Materia Medica and Therapeutics' (1860); 'The Eclectic Practice of Medicine' (1864); 'The Use of Inhalations' (1865); 'Domestic Medicine' (1866); 'The Principles of Medicine' (1867); 'Diseases of Children' (1867); 'Specific Medication' (1871); 'Reproductive Organs and Venereal Diseases' (1874); 'Specific Diagnosis' (1874). He was the most conspicuous eclectic physician of his time.

SCUDDER, Samuel Hubbard, American entomologist: b. Boston, Mass., 13 April 1837; d. 17 May 1911. He was graduated at Williams College in 1857 and at Harvard University in 1862. He was custodian of the Boston Society of Natural History in 1864–70, and was its president in 1880–87. He served as palæontologist on the United States Geological Survey in 1886–92. Author of 'A Century of Orthoptera' (1879); 'Butterflies' (1881); 'Fossil Insects of North America' (1890); 'American Fossil Cockroaches' (1895); 'Catalogue of the Described Orthoptera of the United States and Canada' (1900); 'Index to North American Orthoptera Described in the Eighteenth and Nineteenth Centuries' (1901), etc.

SCUDDER, Vida Dutton, American educator and author: b. Madura, India, 15 Dec. 1861. She was graduated from Smith College, Northampton, Mass., and studied at Oxford, England, and in Paris, France. She became connected with the formation of college settlements, was instructor in English literature at Wellesley College in 1887–92 and from 1892–1910 was associate professor when she became professor of that department. She is the author of 'How the Rain Sprites Were Freed' (1883); 'The Life of the Spirit in Modern English Poets' (1895); 'Social Ideas in English Letters' (1898); 'Introduction to the Study of English Literature' (1901); 'A Listener in Babel' (1903); 'The Disciple of a Saint' (1907); 'English Poems' (1915); 'Social Teachings of the Christian Year' (1921); 'Brother John' (1927).

SCUDÉRY, skü-dā-rē, or **SCUDERI, Madeleine de,** French writer: b. Havre, 15 Nov. 1607; d. Paris, 2 June 1701. She gives an account of her early life under the name of «Sapho,» the title assigned to her by her contemporaries, in her romance, 'Le grand Cyrus.' At 12, she says, she was spoken of as a person of mature judgment, and much admired. On coming to Paris she was admitted to the society of the Hôtel de Rambouillet, and began to assist her brother Georges, a writer of plays, romances and sonnets, in his literary labors. Her first romances were published in her brother's name, and he doubtless assisted in the formation of the plot, or at least suggested the plan of her works. The character of the works themselves is sufficiently explained by the circumstances of their production, but their protracted popularity is not so easy to understand. Her admirers range from Christina of Sweden to Mascaron, Fléchier and Massillon. Boileau himself did not dare to publish his satire during her lifetime. Her works may be regarded as a reflection of the society in which she moved. They consist chiefly of long romances replete with sentiments of love and gallantry; their predominant characteristic is affection.

The heroes of Mlle. Scudéry are the heroes of antiquity, Cyrus, Horatius Cocles, Mutius Scævola and Brutus. These and similar personages meet and discuss with appropriate heroines the anatomy of passion in endless conversations of the most refined subtlety.

The names of her characters were only a transparent mask behind which her readers saw and read themselves. The society of the Hôtel de Rambouillet furnished the originals for all the heroes of antiquity. Cyrus, it is well known, was the great Condé. The society of the day furnished her with endless materials and the gallantries of the preceding night formed the subject of the day's description. Thus with conversation, epistle, sonnet and madrigal she worked out a chronicle of petty intrigue under the greatest names of the world's history. After the reunions at the Hôtel de Rambouillet had been broken up by the troubles of the Fronde, Mlle. de Scudéry opened her own house to a select society on Saturday evenings. In this society, where everybody assumed a sentimental name, love was discussed, according to Mme. de Sévigné, in language so involved, that the speakers were ever in danger of being lost in their own mazes. The interminable conversations and meaningless gallantries which make her works dull at present were precisely what gave them interest when all her characters were known; and as she was admired and respected by those she portrayed, it is evident they were flattered by her portraits. Her principal works are 'Ibrahim, ou L'illustré Bassa' (1641); 'Artamène, ou le grand Cyrus' (1650); 'Clélie, histoire romaine' (1656). Besides these are numerous other romances, poems and 10 volumes of conversations and moral discussions. She obtained the prize in the first competition of the French Academy in eloquence for a 'Le discours de la gloire' (1671). See CLÉLIE.

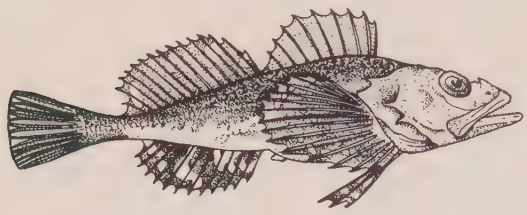
SCUDO, skoo'dō, an ancient Italian coin named from its bearing the impress of the heraldic shield of the sovereign by whom it was issued. The scudo was of different value in different states and at different times. The recent value of the Italian scudo was about $1. The Roman scudo was of gold and worth about $16.

SCULLING. See ROWING.

SCULPINS, the name given to various species of spiny-rayed teleostomous fishes of the family *Cottidæ*, or to the members generally of that family. The sculpins are fishes of striking appearance owing to the peculiar manner in which the body tapers regularly backward from the large, depressed head, and the large size of the fins. The mouth is large, the eyes placed so that they look more or less upward, a bony rod runs across the cheek between the suborbital and the preopercular bones, and the bones of the head are ornamented in varied fashions with numerous ridges and spines. The skin is largely naked but is often provided along the lateral line and elsewhere with bony plates or spines. All of the fins, and especially the pectorals, are of large size and the latter has a remarkably extended base of attachment. The family is a large one, embracing more than 60 genera and 250 species. Most of the species

live in the northern seas among rocks in shallow water, but some remarkable forms live in deep water. Some small species inhabit fresh waters. All are of small or moderate size and are little used for food.

Among the numerous North American species the best known is the common or big sculpin (*Myoxocephalus groenlandicus*). This species reaches a length of two feet, but is usually smaller and is abundant in the North Atlantic, on the American side as far south as New York. In the far north it approaches the coast from the deeper water in summer, but on our shores is



Sculpin.

most plentiful during the winter spawning season. The eggs are laid in large masses attached to seaweeds or rocks.

Sculpins are exceedingly active and voracious and devour all kinds of animals dwelling on the bottom. The sea raven (*Hemitripterus americanus*) (q.v.) is another noteworthy member of this family. Of the freshwater sculpins the miller's thumbs (*Cottus*) are represented by numerous species of little fishes which dwell among stones in cold springs, brooks and lakes, laying their eggs in masses on the under side of stones and guarding them until hatched.

SCULPTURE is the art of shaping figures or organizing forms in three dimensions. Most commonly the shaping is achieved by carving, by modeling or by casting, though other procedures, for instance beating and welding, are also used. The materials employed are extremely varied and range from plastic, amorphous substances, such as clay, to the hardest of stones and metals. The techniques and processes of fashioning sculpture vary with the nature of the materials shaped.

Carving.—To the layman, carving is the most obvious method for producing sculpture. In a broad sense carving comprehends any means by which the sculptor can reduce a piece of material to the form desired by removing the superfluous portions. For this reason it is often called a subtractive process. In the carving of wood the sculptor will use tools similar to those used by carpenters or cabinetmakers, that is to say, saws, chisels, files, etc. Almost all kinds of wood have been used for sculpture, but generally the carver prefers evenly textured woods with little grain. Large wooden statues are made by gluing several pieces together. Some of the softer stones, for instance limestone when freshly quarried, may be carved about as easily as wood, and with similar tools. The preliminary shaping of a block of marble is done with a pick or with points (single pointed chisels). The generalized form is achieved with the use of claws (many pointed chisels) which leave fairly small parallel ridges on the surface of the marble. These ridges may be reduced with flat chisels and files, and the surface polished with abrasives. Drills are used on marble as well as other stones. Extremely hard stones like granite are generally worn down by repeatedly crushing the surface with a many-pointed hammer called the boucharde or bush-hammer.

Modeling.—Modeling is the making of sculpture from plastic, rather soft and yielding materials, such as clay or wax. While the sculpture so produced may occasionally be the complete work, usually it is intended to be translated into a more durable material. Clay, of course, may be baked to form terra cotta, which is as durable as tile or brick. When he prepares a large work for baking, the sculptor makes it hollow if it be in the round, or rather thin if it be in low relief, to insure thorough baking of the entire fabric and to avoid fracturing from sealed-in moisture, which under heat would literally explode.

Modeling is often called an additive process, signifying that the work is produced by adding piece by piece until the whole is built up. Thus it is distinguished from the subtractive procedure of carving. Actually, carving tools of wood and wire, suitable for the soft materials, are used in modeling to cut away or scoop out unwanted material. A more significant distinction between modeling and carving lies in the fact that the material of the modeler is amorphous and yielding with virtually no form except what the sculptor gives it. This is illustrated by the usual procedure of modeling in clay. First the sculptor visualizes quite clearly the completed work (often he makes drawings or small models for this purpose); then he constructs an armature (a kind of skeletonlike structure) of wire or pipes depending on the size of the work; and then he adds handsful of clay to the armature until he has built up the complete bulk of his statue. He finishes the modeling by manipulating the clay with his hands, by carving, and perhaps by producing some textural effects. While the procedure just described pertains to sculpture in the round, the same procedure with some variations applies also to work in relief, although in relief the structure to which the clay is added is a board rather than an armature.

Metal Techniques.—Repoussé is the technique of pushing, beating, or hammering quite malleable metals, such as copper, lead, and aluminum, into the form desired. Frequently the metal is beaten into shape over, or into, a form which has been produced by carving or casting. This is a handicraft reproductive process akin to the manufacturing process of stamping with dies. Twentieth century artists generally employ the freer technique of beating the metal into shape without the use of prepared forms.

Other metal techniques include the hammering into shape of metal (especially wrought iron) which has been softened by heating; and an additive process of constructing a work of sculpture with blobs of molten metal using welding equipment and materials. Both of these techniques are most used for small works since the products are apt to be solid and therefore very heavy for their size.

Reproductive Processes.—These have been, and still are, of great importance in the art of sculpture both for making replicas of originals and as a phase in the production of original works. When used for the latter purpose the artist should have had in mind from the beginning of his work the possibilities and limitations of the reproductive technique as well as the character of the

SCULPTURE, CLASSIC

"Greek Head."

"Augustus."

"Egyptian Head."

The Metropolitan Museum of Art

"Roman Head."

SCULPTURE, CLASSIC

"Discobolus" by Myron.

"Nike of Samothrace."

"Eirene with infant Pluto."

The Metropolitan Museum of Art

"Athena" (bust).

final material. The chief reproductive processes are casting and pointing.

Casting is the process of producing objects, or reproducing the form of objects, by putting into a mold a plastic or temporarily fluid material which will assume and retain the shape of the mold. Since casting is extensively used in industry, a great variety of techniques and materials have been developed for specific needs. Nearly all of these procedures and materials may be used for the casting of sculpture, however only a few are much employed by the sculptor.

The model of the work to be cast is usually produced by modeling a plastic earth or wax; however carved works will serve as well, and are frequently copied by casting. Indeed, the mold, or matrix, which has the negative form of the work to be produced, may be fashioned directly without the use of a positive model. This has seldom been done for sculpture and then usually for extremely simple works.

Molds may be made of flexible materials such as glue, gelatin, rubber or agar compositions, or they may be rigid of plaster of paris, terra-cotta, sand, metal, etc. Flexible molds, first developed about the middle of the 19th century, are especially useful for the casting of intricate forms with undercuttings. The older, traditional methods of casting employ rigid molds which may be either waste molds or piece molds.

A waste mold is a negative mold that will be fractured and destroyed in order to free the positive cast within it. A new mold must be made for each work produced. The major sculptural use of the waste mold is in the process of bronze casting known as *cire-perdu* (or lost-wax).

Benvenuto Cellini (1500–1571) described the lost-wax process which he used for the casting of his bronze relief *Nymph of Fontainebleau* and his statue *Perseus*. He began by modeling each work in fire-resistant clay over an armature. These he allowed to dry until they had shrunk about one half inch all around. Then he covered them with a coating of wax somewhat less than a half inch in thickness, which he carefully modeled and finished in every detail. For each work, over the wax he placed successive layers of fire-resistant clay until he had built up a heavy envelope, which was firmly attached by transverse bronze rods (used skewer fashion) through the layer of wax to the inner clay core. With the application of heat the wax was melted and drawn out through apertures left for that purpose, and when the core and envelope were thoroughly dried, the molten bronze was poured in so as to replace, and reproduce exactly, the form of the wax. When the outer envelope, or negative mold, was broken off, the sculpture was revealed as he had modeled it in wax except for projecting bronze rods and pouring channels which had to be cut down to the surface of the statue. This method, also used by the ancient Greeks and the Chinese, produces the finest quality of bronze casting; however, it is not always successful. Sometimes the bronze does not flow into all parts of the interior space, in which case the sculptor may have to repeat his work from the beginning. Giorgio Vasari (1511–1574) describes a method to avoid remodeling the original in such an eventuality by taking the precaution to prepare a piece mold of the statue before the enclosing envelope is put on.

A piece mold is a negative mold (as is the "envelope" discussed above) which is made in two or more sections so that when properly reassembled it will constitute a complete negative mold.

In making piece molds of plaster of paris from a clay or wax model, the division of the sections is obtained by inserting fences (thin strips of metal) into the model where such divisions are needed. If the model be of plaster or some other hard substance, area separators (thin strips of clay) are put on the model to form the boundaries of the sections. The separation of the sections in the metal casting technique, known as the sand-mold process, is achieved by applying thin layers of nonfusable material at the section boundaries.

When casting sculpture in metal it is desirable, if the work be of more than the smallest dimensions, that it be hollow. For this reason a core must be constructed to fit precisely within a piece mold so that there will be left between the core and the enveloping mold a space of just the thickness desired for the metal. Such cores are fixed in position with metal rods as in the lost-wax process.

Of all casting materials the most used by sculptors is plaster of paris (calcined gypsum, or sulphate of lime, or $Ca\,SO_4 \cdot \frac{1}{2}\,H_2O$). Except for its fragility it is an almost ideal casting substance. It is available everywhere cheaply. It is safe to handle, simple to use, and sets rapidly. Also it expands slightly on setting and thus tends to fill the mold completely to produce a clear cast. Usually when a work in clay has been modeled it is cast immediately into plaster, for the clay will not long maintain its shape under most conditions. Such a cast requires the making of a piece mold in plaster and then the use of the piece mold as a negative to cast a positive which will be a replica in plaster of the original clay. Specially prepared plasters are also used in making piece molds for the casting of nonferrous metals.

Of all the metals cast by the sculptor, bronze (an alloy composed chiefly of copper and tin) is the most extensively employed because of its great structural strength, resistance to atmospheric corrosion, ease of casting, and its fine, compact surface which permits a great variety of finishes in texture and color. Other metals cast as sculpture in the approximate order of their popularity for such use are: brass, copper, iron, lead, aluminum, pewter, silver, gold, and platinum. The last three are used mostly for very small works and jewelry. Other materials for which casting is an appropriate technique are: cement, and clay for terra cotta.

A variety of methods, materials, and tools are employed in finishing a work after casting. Besides removing the ridges left where sections of a piece mold join, and other protuberances such as the transverse bars used to hold cores in position, there are also apt to be holes, often caused by air bubbles, to fill up. Metal is filed, chiseled, or sometimes beaten, to bring out detail or modify the rough cast. Colors are changed or patinas added by the use of chemical fumes or baths. Sometimes metals are electroplated or inlaid with other metals.

Pointing is a term applied to the processes employed for copying three-dimensional models (or finished works) by the use of geometrical measurements and drilling. While sculpture of any material may be thus copied, models specially prepared for pointing are generally of plaster. The material on which the pointing is

executed may be any which is suitable for carving. Marble and limestone are probably the most used. The model may be the same size as the copy which will reproduce it, or it may be any reasonable fraction of its size, or even larger, for there are also devices to enlarge or diminish the scale.

The mechanics of pointing are best explained by describing a device used by Benvenuto Cellini. After the model was finished, Cellini chose a block of marble large enough to produce the statue in the size desired. Around both the model and the block were constructed identical frameworks like cubical boxes. A measurement then would be taken from the model by measuring so far down from the top of the framework, so far across from one of the sides, and so far in, almost to the surface of the model. The first two measurements would be repeated on the framework which enclosed the block of marble, then where the lines met, a hole would be drilled into the block until it reached the depth taken in the third measurement from the model. A great many measurements of such points, and the consequent drilling of them, would enable the sculptor to chip off the marble between the holes with the result that the block would assume roughly the form of the model. The more points taken, the closer the copy would approximate the model. The sculptor finished the work in the usual manner of carving marble by removing the final thin layer of marble.

While rough devices such as Cellini described, were used in Greek and Roman times and from the Renaissance through the 18th century for copying and enlarging, they were generally so used by the sculptor himself, who might in the finishing, leave the feeling of his own personal handling on the work. About the beginning of the 19th century, however, new pointing machines, infinitely more accurate, resulted in the development of pointing studios where models were reproduced by skilled workmen even down to the final finishing and polishing. Thus the sculptor tended merely to model in clay and cast in plaster. The actual carving was done in the pointing shops; just as the casting, if the model was to be translated into metal, was done in foundries.

Since the sculptor in the 19th century worked in clay, and thought in terms of modeling, many of the works of that period exhibit little appreciation for the beauty of the material into which the model was ultimately translated. Because of this, early in the 20th century there began a reaction against modeling with the result that many sculptors turned to direct carving, which they considered the only honest way for a sculptor to work. By direct carving they meant carving without the use of a preparatory model, although small, sketchy models were generally condoned. The aim of these reformers was primarily to make the materials of the sculptor expressive. Some artists would contemplate a particular stone or piece of wood until the shape, the color, and the grain of the piece suggested a form within which needed only to be freed by the sculptor's tools. Carving by the sculptor himself was thus reintroduced to the art. There is no doubt that this recognition of the expressiveness of the special qualities of a given material has helped to develop a new interest in the art of sculpture. The tenets of the direct carvers also influenced those who modeled for casting to the extent that they re-examined properties and possibilities of the materials used for casting. Some sculptors working in metals, have given up casting in favor of the direct handling of the metals by hammering, heating, and welding. So, too, the artists who continue to have their works pointed, have tended to study the nature of the materials pointed, and to do the finishing of their sculpture themselves when it is important.

Aesthetic Aims.—The aesthetic aims of sculpture are best treated in relationship to the practical factors which affect the individual works of art. These factors involve the use and significance of the work; size; if it be in relief or in the round; if it be made primarily for tactile or visual effect; and the material and technique.

By and large sculpture has been made for practical purposes: to produce magical effects as among primitive peoples; to make deities, idols for pagans to worship, or images for devotional purposes as for the Buddhists and various Christian sects; to embellish and give meaning to architecture; to perpetuate the soul as among the Egyptians; or to preserve the memory of persons and events. These significant purposes have generally been served by sculpture of considerable size, and there is no doubt that largeness promotes an effect of impressiveness in sculpture as it does in architecture. This is borne out by the observation that most sculpture which has been made merely to embellish or to delight is definitely under life-size or even of the statuette category. A notable exception to this rule is found in fountain sculpture from the 16th century on, where the architectural or arboreal setting often requires commensurate scale in the sculpture.

Sculpture, both large and small, may be in the round, made to stand free and be observed from all sides, or it may be in relief, that is to say, either attached to a background or made to be placed against a background. Most sculpture in the round proportionally reproduces the full roundness of the object represented, while sculpture in relief may vary from full roundness (high relief, *alto rilievo*), to a much flattened representation (low relief, bas-relief, *basso rilievo*). An intermediate degree of flatness is called mezzo relief (or *mezzo rilievo*); and an extremely flattened effect is spoken of as *rilievo schiacciato* (literally: crushed or squashed relief). Sculpture in relief is made to be seen from a limited angle of vision, while sculpture in the round may be designed to be viewed all the way round. To achieve success in sculpture in the round, the sculptor strives to produce a form which will have profiles and interrelations of masses that are interesting and effective from all points of view. The consideration of the point of viewing a work of sculpture sometimes affects the design and execution of a work; for example, when sculpture is destined for a greatly elevated position, as on a church façade, it may well be very simply designed and boldly executed, in order that the spectator shall be able to understand its message almost at a glance. Some work, too, which is in such a position, shows signs of adjustment in the proportions of the limbs of a figure to counteract the pronounced foreshortening when seen from below. Closely connected with these considerations are those which have to do with the lighting for which the work is made, and the distance at which it is normally viewed. For most sculpture soft, rather diffused light is agreeable, but some boldly under-

cut work as in the baroque style, gains force and dramatic effect when illuminated by a shaft of direct light, or spotlighted. Sculpture made for an open air setting must take into account the varied effects of light that will be encountered. This sculpture is apt to be broad in execution with little attention to subtle detail, and to exhibit very strong outlines, for under many lighting conditions such a work is seen chiefly in silhouette.

Sculpture, unlike painting, may be appreciated by touch as well as by seeing. Even if one does not actually touch it when contemplating a particular work of sculpture, the appreciation of the smoothness of surface and the modulation of one mass into another may be so strong that the mind receives the sensation of touching. This is commonly referred to as tactile quality, and oftentimes the kind of sculpture which produces a strong tactile expression is called plastic. Small works of sculpture, such as some of the Chinese jade carvings, invite one to take them in the hand. Naturally such a carving has pronounced tactile quality. Obviously different works of sculpture vary markedly in this tactile sense. Sculpture which appeals much more strongly to the visual sense is spoken of as pictorial. Such work is usually rough, might even be unpleasant to touch, and makes its effects largely by plays of light and shadow, often with extreme contrasts produced by deep holes or grooves.

The material chosen and the technique of fashioning adopted by the sculptor will vary according to the considerations discussed above except when the sculpture is made with no definite use in mind. In such a case a sculptor may, for example, permit an irregular boulder or unusual piece of wood to suggest a form, which then would be realized by direct carving, even letting the nature of the material alter the form while the work is in progress. Modelers in clay, when producing a work for exhibition or undetermined use, also enjoy a certain freedom from the dictates of significance, use, placing, and lighting. When the work, however, is commissioned for a particular use and place, then all of the other factors involved should be subservient. Generally speaking, this was true of sculpture until the advent of the 19th century when selling through the agency of exhibitions and dealers began to supersede the direct patron to artist relationship with rather unhappy results, for the sculptor, like other artists, benefits by exercising that discipline developed in solving specific problems of use and significance.

The criticism of sculpture is as difficult and complicated as that of any of its sister arts, but the recognition of quality in a work of sculpture is attainable by any intelligent person without too much study. As the noted scholar, Dr. Gombrich, wrote, "I do not think there are any wrong reasons for liking a statue. . . ." That authoritative statement should give courage to the beginner. To put it in brief: what makes a work of art good is when every part and every factor is working together to enhance the effect of the whole. To judge a work of art one should contemplate it until its message is clear; then, and only then, analyze it to determine if all its parts and its handling are right for achieving that message. Do not condemn a work for being what it is not; do not ask a Romanesque figure to have Greek proportions, nor expect an abstract work by Constantin Brancusi to reproduce nature as much as a statue by Auguste Rodin.

Sculpture Related to Architecture.—Architectural sculpture may serve to illustrate the application of some of the factors discussed above to particular problems. In Egypt, sculpture on the exteriors of temples was simplified to deeply incised outlines with only slight modeling of the figures within (sunken relief) in order that the viewer readily might read the meaning in the prevailing, intense light. On the interior walls of temples and tombs the use of low relief prevailed. Where the light was dim this relief was made more visible by painting. In Mesopotamia the outstanding use of architectural sculpture was to embellish the lower portions of the walls of open courtyards with bands of low relief recounting deeds of the kings. Because these would be seen close up and were in shadow much of the time the very flat relief needed only slightly raised outlines with a system of bumps and grooves reserved to emphasize important areas, such as heads and arms. The later Babylonians faced the exterior walls of city gates and ziggurats (pyramidal towers of worship) with colored glazed tiles which had animals formed in relief on them. Since the animals were done in colors contrasting to the plain wall areas, they told readily even in brilliant light.

The Greeks, too, used color on their sculpture: marble statues had tinted hair and touches of color in the eyes, on the lips, and in decorative patterns of the draperies; bronze figures often had inlays of other colored metals or enamel; while those made of inferior materials, such as limestone, terra cotta, and wood, were often entirely painted. From traces of pigment still extant, it is clear that color was extensively employed for architectural sculpture. The most important use of sculpture on Greek temples of the developed period was in the pediments (the wide, rather low gables) which were filled with groups of figures carved in the round, but which because of their enclosed position told as reliefs. The backgrounds for these groups were generally painted a deep blue against which the light marble statues stood out in golden splendor. The clarity of the individual figures was heightened by arranging them so that one did not much overlap another. They were like actors carefully posed on a long stage only two feet deep. This was especially true in the earlier works such as the temple at Aegina and the Temple of Zeus at Olympia. The famous pediments of the Parthenon, done under Phidias, had the figures arranged with more overlapping, with the effect of greater backward and forward movement, and consequently with less clarity of outline. To cause his groups to be effective at the 50 or more feet from which they would be seen, Phidias introduced pronounced modeling and undercutting so that a play of rich shadows would bring out the forms. Greek temples also used sculpture in the friezes (horizontal bands above the columns) which also were high above the ground on the larger temples. In the Doric order this sculpture was in square plaques (metopes); in the Ionic it was in a continuous band. Such work was executed in low or mezzo relief. In general one feels that Greek sculpture maintains its identity as sculpture though it blends harmoniously with the architecture and embellishes and adds to its meaning. Most free-standing Greek sculpture, on the other hand, seems to have a strong affinity for architecture. This is illustrated by the fact that when displayed in museums it is most

effective when set against walls or even placed in niches.

The Romans used sculpture architecturally much the same as the Greeks. The Romans did, however, employ relief, both of figures and of ornament, for what might be called a textural, decorative effect on walls, vaults, and other architectural surfaces. When such a textural effect develops, sculpture tends to become ancillary or secondary to the architecture instead of maintaining its status as an equal and relatively independent art.

Sculpture on medieval buildings was distinctly subservient to the architecture. Especially was this true up to the Gothic period. On the façade of the Church of St. Trophime at Arles the sculpture was so intimately woven into the architectural elements that the separation of the two arts is here unthinkable. Figures seem to grow out of the walls, to be part of one organic creation. Figures were often distorted to fit architectural areas, or, as on the west façade of the Cathedral of Chartres, they were elongated to accord with the architectural character of the columns to which they were attached.

The Gothic period of the 13th and 14th centuries witnessed a gradual and partial emancipation of sculpture from architecture. Then, as seen on the great cathedrals of Amiens, Reims, and Bourges, sculpture in low relief and sculpture that was placed high remained, as in the Romanesque period, a part of the architecture giving textural richness and added emphasis to architectural form. But statues in niches or scenes in high relief which were near eye level began to be more independent of their architectural setting, though still heeding its demands.

The great sculptors of the Early Renaissance, like Donatello in his statues for niches on the campanile of Santa Maria del Fiore and Or San Michele, gave their statues so much character and vitality that one hardly thinks of the architectural functions. The latter do exist, however, even if they seem to lie chiefly in the realm where the architecture is ancillary to the extent of providing a frame and setting for the sculpture. The independence of the sculpture is often more marked by being different in color and material from the architecture.

During the High Renaissance of the early 16th century the relationship of sculpture to architecture was similar to that of Greek classical times: the two arts were working together in a fine balance, neither striving to dominate the other. The best illustrations of this, though a bit late for the period, would be the Loggetta and the library of St. Mark's Church in Venice by Jacopo Sansovino and assistants. In the continuance of Renaissance architecture into the 17th and 18th centuries there was little change in this relationship; but on the whole sculpture tended to become more subservient in the later periods when it was often used to enliven, sometimes almost animate, certain features of the architecture, especially where the building meets the line of the sky. This sculpture, while bold in its outlines and undercuttings, was generally coarse in execution (because it was not to be seen close by), and of little merit when taken from its original setting.

Sculptors of today can learn something from the great architectural sculpture of the past, but they must remember that a new style of architecture requires a new relationship of sculpture to architecture. From the past both sculptor and architect can learn effects of placement and lighting. They can learn the value of contrasts of color and material, and the telling power of light and shade and silhouette. Also they should be able to discern in what ways sculpture will enhance and give aesthetic accent to architecture.

HISTORY

The history of sculpture goes back to the paleolithic period in western Europe, a time when man was also making the earliest known paintings. Typical works are small statuettes of women, and reliefs of animals of the chase, reindeer and bison. Some though in soft clay have been miraculously preserved, many are engravings on bones or antlers, and some are carved in very soft stone. As might be expected, since these were executed before the use of metal was known they are simple in technique; many, however, are remarkable either for their organization of sculptural masses, or for their seizure of essential characteristics to achieve lifelike forms. It is believed that this early sculpture was eminently practical in a magical sense; for example, that the making or possession of a representation of a bison would ensure the hunter of success in hunting that animal.

Egypt.—Egyptian sculpture we know was highly endowed with magical properties. For the ancient Egyptian the representation of an object stood for the object itself. This was particularly important for the Egyptian credence in a life after death. The Egyptians believed that an aspect of the soul, called the *ka,* was a counterpart of the body, that it was born with the body, continued through life with the body, that it looked like the body, though invisible, and that at death they went together into the next world. It was essential to the everlasting life in the hereafter that the likeness of the body be preserved. This was done first by mummifying the corpse, and later also by making more permanent replicas of the body in sculpture. Thus the Egyptians were the first to develop the art of portraiture. The depiction of food, animals, servants, and acts of service, largely in relief or painting, also served the magical duty of providing for the wants of the *ka.* It was to provide for the life in the future that the tombs of the kings and nobles were so completely furnished and adorned with portraits in the round and pictures on the walls.

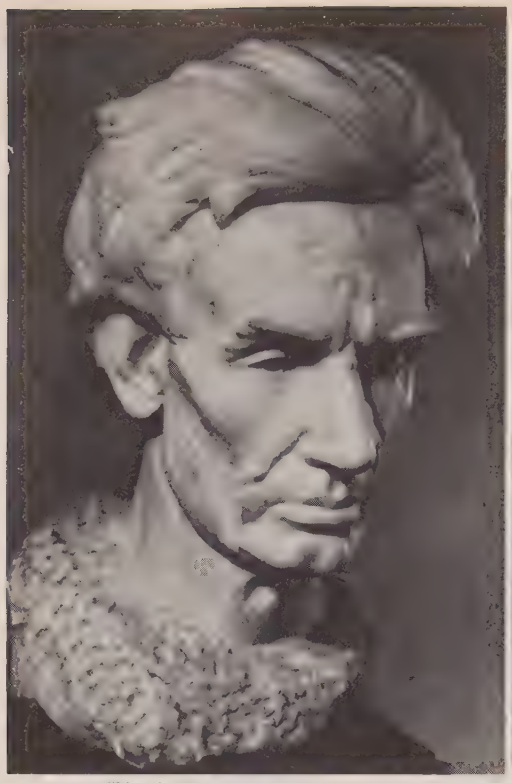
The earliest known large portrait statue is that of King Zoser, of the 3d dynasty (c.2700 B.C.), whose tomb was the first pyramid, the Step Pyramid at Saqqara. By this time Egyptian civilization and its art seem to have been realized in the essential form that it was to continue for more than 2,000 years. Some of the finest portraits were produced not long after Zoser in the period known as the Old Kingdom (2700–2200 B.C.). From then came the great diorite *Khafre* in the Egyptian Museum at Cairo; the double portrait of Menkure (Menkaure) and his queen in the Boston Museum of Fine Arts, executed in a dense slate; the seated *Scribe* in the Louvre of painted limestone; and the wooden statue, known as the *Sheikh-el-Beled,* also in the Egyptian Museum at Cairo. Egyptian statues, such as these, represent nearly always figures either standing or seated, and observe what is called the "law of frontality" (a plumb line dropped from the middle of the forehead would

SCULPTURE

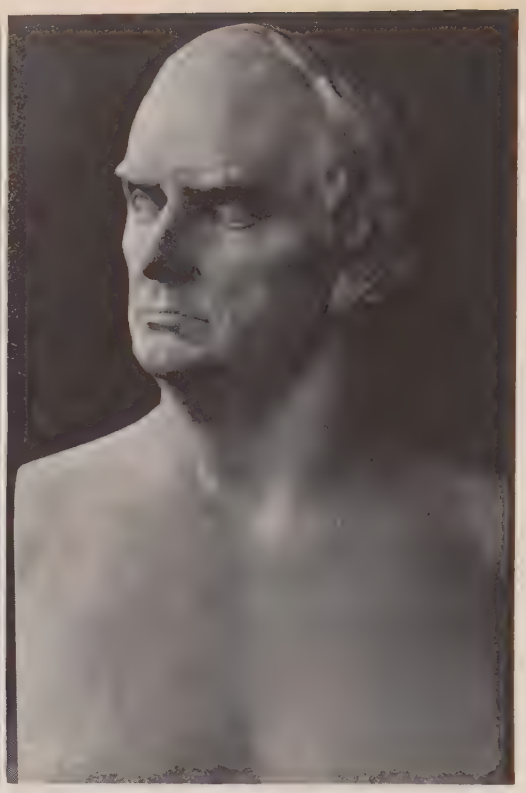
The Metropolitan Museum of Art

"The Thinker" by Rodin. "Sun Vow" by Hermon Atkins MacNeil.
"The Wounded Indian" by Randolph Rogers (insert).
"Mares of Diomedes" by Gutzon Borglum.

SCULPTURE

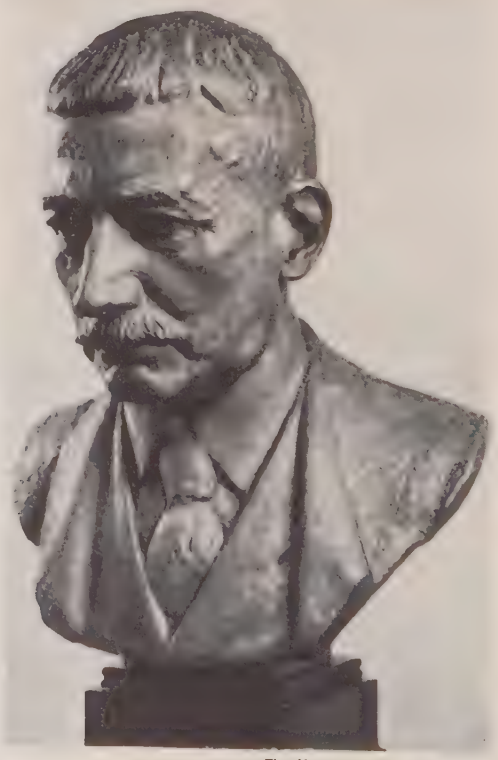


"Lincoln" by George Grey Barnard.



"Webster" by Thomas Ball.

"Modern Crusader" by Malvina Hoffman.



The Metropolitan Museum of Art

"Elihu Root" by James Earle Fraser.

divide the figure into two virtually equal parts). There is no bending to right or to left, and the head always faces straight forward.

In the Middle Kingdom (about 2050–1800 B.C.) portraiture continued to use the same poses and conventions. Royal portraits of this period, like the head of King Amenemhat III in the Ny Carlsberg Glyptothek, Copenhagen, usually seem less idealized than the earlier portraits with more detail in the features utilized to bring out not only the personality but even the thought of the king.

During the period known as the Empire or New Kingdom (about 1465–1090 B.C.[1]) the old forms, with some notable exceptions, continue. The lifesize figure in basalt of Thutmose (Thothmes) III in the Egyptian Museum at Cairo is one of the finest examples of the conservative tradition. Colossal portraits in the traditional mode and broadly executed are also characteristic of the Empire. Such are the four huge statues, more than 65 feet high, cut out of the living rock in front of a temple at Abu Simbel in Nubia. Some of the statues and statuettes of this period, however, are more lifelike than usual in Egyptian art, and tend to deviate from the old conventions. Especially is this true of the portraits of Ikhnaton, the rebel king, and his wife, Nefertiti (Nofretete), which attain a high degree of individuality and naturalism.

Egyptian sculpture in relief is usually very low in projection, sometimes hardly more than incision, and is closely related to Egyptian painting in its conventions, which derive largely from the desire to represent things, or parts of things, in their most characteristic attitudes. The head is shown in profile, but the eye is full face as are the shoulders and the chest, while from the waist down the profile is again employed. Kings are represented much larger than servants. Depth is indicated by placing distant objects above those which are nearer. These characteristics were established very early, as shown in the Palette of King Narmer in the Egyptian Museum at Cairo from about 3000 B.C. By and large, sculpture in relief in the early period was used on portable works; in the Old Kingdom, primarily for the walls of the tomb chambers; while in the Middle Kingdom, the Empire, and later, besides these uses, relief for the embellishment of temples was common. For this purpose the Egyptians developed what is called "sunken relief," where the outlines of the figures are deeply carved into the surface of the stone and the figures within are only lightly modeled. Nearly all relief was painted.

Mesopotamia.—Mesopotamian sculpture, like the civilization of that region, paralleled the Egyptian chronologically (c.3000–539 B.C.). Three important factors influenced a development different from that of Egypt: first, stone had to be imported at great expense; secondly, the people had no cult of the dead which fostered the art; and thirdly, since the land was not protected by natural barriers, invasions with consequent changes in religious and cultural outlooks prevented the continuation of inflexible traditions. From early times small statues of priests or priest-kings like the diorite *Gudea* in the Louvre from about 2450 B.C., and reliefs picturing important events, are the most notable forms. Sculpture in the later period under the Assyrians (c.1275–607 B.C.) was largely employed for the decoration of the walls in important areas of the royal palaces. Reliefs from the palaces of Ashurnasirpal (r. 884–859 B.C.) and Ashurbanipal (r. 669–626) depict the lives of those kings. Also characteristic are the colossal, man-headed and winged bulls and lions which flanked the chief entrances to the palaces. The British Museum in London is the greatest repository of Assyrian sculpture but splendid examples may also be seen in the Metropolitan Museum of Art in New York and at the Oriental Institute in Chicago.

The general traditions of Mesopotamian sculpture, which obeyed conventions similar to the Egyptian, continued in the Achaemenian Persian period (539–331 B.C.) with some Greek influence apparent in the later work. The greatest site was Persepolis.

Greece.—In Greek lands the earliest sculpture, of great interest to 20th century artists because of its abstract form and simple, beautiful handling of marble, is a group of violin-shaped idols from the Cyclades (about 3000 B.C.) now in the National Archaeological Museum at Athens. Then followed the brilliant Aegean civilization (c.3000–1000 B.C.) with its chief center the island of Crete, which produced little sculpture of large size, but many statuettes in terra cotta and ivory, and very remarkable small reliefs in various materials. Of large works the Lion Gate at Mycenae (about 1400 B.C.) is the most eminent, and of the smaller, outstanding are the gold *repoussé* cups from Vaphio (c.1500 B.C.) with bulls in relief.

Greek sculpture, properly speaking, began a few centuries later, after the Greek-speaking invaders of the Aegean area had settled down to create a culture of their own. Sculpture from the Geometric period (about 900–700 B.C.) consists mostly of bronze statuettes of warriors and horses. These figures are of elongated proportions with a tendency to emphasize triangular masses. Large cult statues were probably made of wood, as we are told they were in the succeeding period.

After the Geometric period the general course of Greek sculpture was toward ever-increasing naturalism. This tendency was fostered by the nature of the Greek religion whose gods and heroes were conceived in human form, only more perfect and more powerful than ordinary men. Also the association between the worship of the gods and the great, periodic athletic games, such as those at Olympia, turned the minds of the people toward the appreciation of physical beauty and thus spurred on the artist's search for ways to depict that beauty more and more naturally. The ensuing periods of Greek art are differentiated primarily by their changing factors of naturalism.

The Archaic period (650–480 B.C.) is usually divided about 550 B.C. into early and late phases. Examples of Greek archaic sculpture are abundant and of many materials, except wood because that has perished, both in relief and in the round. For statues in the round the "law of frontality" held as in Egypt and Mesopotamia. For figures in relief, which includes pedimental sculpture, the desire to represent things in their most characteristic attitudes was particularly strong during the early phase of the archaic when a single figure was done part in profile, part in full face. It is reasonable to assume that the older traditions of Mesopotamia and Egypt influenced Greek sculpture of this time.

The types used in free-standing sculpture were

[1] Some chronologies date the Empire 1580–1085 B.C.

chiefly the standing male nude, or "Apollo" type, which apparently was employed to represent both gods and athletes with no variation which we are able to perceive in most cases; and draped female figures either seated or standing. The increase in naturalism from the early to the later archaic was great and was accompanied by technical advances in the working of marble and the casting of bronze. In fact the casting of large statues in bronze toward the end of the period was a proper accompaniment to the growing naturalism, for such castings were based on modeling, a technique of fashioning sculpture which invites a naturalistic approach. From this time on bronze was the most used material in Greek sculpture other than that employed for architectural decoration; and the practice of modeling affected the design of the work in stone as can be seen in the late archaic pedimental groups from Aegina, now in the Glyptothek at Munich.

The Transitional period (480–450 B.C.) produced one very famous master, Myron, whose bronze originals, such as the *Discobolus* and the *Boy Extracting a Thorn from his Foot* are known to us only through later copies. However, one can get a good idea of the restrained and dignified naturalism of the period in the bronze *Charioteer of Delphi*, museum at Delphi, and the *Zeus* in the museum at Athens, both by unknown artists. The great monument of architectural sculpture of this style was the Temple of Zeus at Olympia. Well-preserved pieces of these marbles are in the museum at Olympia.

The Golden Age, the great period of Greek sculpture, is customarily divided into 5th century (450–400 B.C.) and 4th century (400–300 B.C.). Undoubtedly the creations of two of the world's greatest masters, Polyclitus of Argos and Phidias of Athens, determined to a great extent the character of sculpture during the Golden Age. The art of this period is so impressive in its quiet dignity, so reserved in its expression of power, and so measured in its fine naturalism, that we have long called its products classic (which means, literally, first-class). Though many admired originals exist from the 5th century, ironically there is no work which we can say was done by the hand of either Phidias or Polyclitus. The nature of the latter's style may be fairly well observed in the *Doryphorus* or *Spear Bearer*, a marble copy of a lost bronze statue by Polyclitus. It is a stocky athletic figure with the anatomical details broadly but strongly rendered. The head is more natural than in earlier Greek work but not so natural that it draws attention from the harmonious, powerful body. Polyclitus established a norm for the depiction of the male nude not only for Greek sculpture but for later Western civilization, so much so that subconsciously even people who have never heard of Polyclitus tend to measure the deviation of other works which may be much more realistic, or stylized, or distorted, against that norm.

The accomplishment of Phidias in establishing classic ideals was even greater, if we can judge correctly on the basis of copies and the extant fragments of the sculpture from the Parthenon, which was done under his direction. Phidias created gods, or, at least, established our visual concepts for them. The echo of his serene, powerful types for Zeus and Athena has continued through the ages. Also it would seem that we owe to Phidias the development of a whole new order of poses which are at once serene and graceful as well as expressing a latent power for action. This is seen in the fragments from the pediments of the Parthenon, which also reveal a new music in the rendition of draperies, which are naturalistic and expressive of the bodies to which they cling.

In the 4th century the serene nobility of concept continued but began to be tempered by more human emotions. Naturalism developed to show figures in more active poses, to render the soft textures of skin and hair, and to depict emotions. It is not surprising then that during this period true portraiture first appeared in Greek sculpture. Three great sculptors dominated the age. Scopas of Paros, whose style is known through ancient descriptions, copies, and some heads found at Tegea, where he was the architect of the Temple of Athena Alea, made use of his greater anatomical knowledge to render figures in poses expressing great emotional tension. His heads, too, depict violence of feeling in their wide-open eyes, distended nostrils and parted lips. Praxiteles, the most famous sculptor of the period, is known for his exceedingly graceful, languorous renditions of Aphrodite (Venus) and the younger male gods. Characteristic are his relaxed, "S-curve" poses, the dreamy, contemplative expression of his heads, and his caressingly soft treatment of the texture of skin. His famous nude Aphrodite of Cnidus, known through a copy in the Vatican, serves to illustrate that Praxiteles set the standard for future sculpture of this subject. His Hermes, discovered in 1877 in the excavation of a ruined temple at Olympia, where Pausanias said he had seen it, is considered to be the only sure work we have from the hand of any of the most famous Greek sculptors. Seemingly, Praxiteles was the only one among these greatest of the Greek sculptors who used marble in preference to bronze for his works. The third, and decidedly youngest sculptor of the period, was Lysippus, who is said to have made many portraits of Alexander the Great, and to have produced 1,500 works, all in bronze. Ancient descriptions of his style accord with the *Apoxyomenos* or the *Scraper*, a marble statue in the Vatican, believed to be a faithful copy of a lost, bronze original. The freedom of pose, the detailed handling of anatomy, and the almost portrait-quality of the head will illustrate the fairly high degree of realism attained in the latter part of the 4th century. His brother, Lysistratus, is said to have been the first Greek sculptor to take a cast from the face of his model, which, of course, is an indication of the developing realism which was to mark the following period. The outstanding examples of architectural sculpture from this time are the marble statues and reliefs, mostly in the British Museum, from the Mausoleum at Halicarnassus.

The Hellenistic period which dates from the death of Alexander in 323 B.C. to the Roman conquest of Greece in 146 B.C., witnessed the spread of Greek culture into Egypt, the Mesopotamian Valley, and east to the Ganges. Established native traditions in some of these regions, in Egypt and Gandhara in northwestern India for example, modified the Greek quality of the sculpture produced there, but on the whole, sculpture of the Hellenistic civilization continued to develop much the same as it might have, had its area of production been confined to Grecian territory. The chief tendencies were toward greater realism both in subject and treatment, and the search for novel and striking effects. Many works, however, preserved the dignity and restraint of the Golden Age. Some notable works of classic spirit are: the *Aphrodite of Melos* (*Venus de Milo*) in the Louvre, the *Aphrodite of Cnidus* in Rome, and the *Victory of Samothrace* also in the Louvre. The elegant *Apollo Belvedere*

in the Vatican, which influenced so much the art of the Renaissance and later periods, is very likely a Roman copy of a bronze original from the late 4th century. The new realism is seen in the pathetic bronze *Boxer* in the Naples Museum, in the bronze *Hellenistic Ruler* in Rome (a full-length portrait in the nude), and in many genre (subjects from everyday life) works, such as the *Old Market Woman* in the Metropolitan Museum and the *Boy with a Goose* in the Capitoline Museum, Rome. Also realistic is the *Dying Gaul,* Capitoline Museum, a copy of a work from the school of Pergamum, a city-state in Asia Minor. A later work from Pergamum, the *Altar of Zeus,* combined the heroic proportions of Phidias with an intensification of the emotional qualities of Scopas. The *Laocoön* group also is in much the same spirit.

Etruscan.—Etruscan sculpture early developed a remarkable tradition in the Italian peninsula. Early Etruscan bronze devotional figurines, often extremely attenuated, are admired for their expressiveness and sympathetic use of the material. From the 6th century on Greek influence is manifest. Large painted, terra cotta figures of amazing technical skill were used for temple pediments, and on sarcophagi to represent the deceased. The Etruscans developed lifelike portraiture earlier than the Greeks, primarily for funeral purposes.

Roman.—Roman sculpture evolved from Etruscan and continued, in many respects, the Hellenistic traditions. Indeed, it would seem that great numbers of the sculptors were of Greek origin. Also Rome imported works of sculpture from Athens and other centers of Greek art. The term, Roman, however, applies not only to the city of Rome, but also to the huge empire which that city built up, thus sculpture from Athens or Spain is called Roman if done during the period of Roman dominance.

For the making of statues of gods and heroes the Hellenistic tradition continued, though weakened in vigor and originality by the Roman collectors' preference for older works, or even copies of them, to any new work showing great originality. In the field of sculpture in relief, for which the demand was great, the situation was not so static, though one cannot discern a clear line of development. Under Augustus (27 B.C–14 A.D.) the sculptors of the *Altar of Peace* (*Ara Pacis Augustae*) were rather academic in following Hellenistic and earlier Greek models for reliefs of a sacrificial procession and allegorical figures, but manifested true originality in their fine carvings of garlands of fruit and flowers. Two reliefs on the Arch of Titus (*Arcus Titi,* dedicated in 81 A.D.), achieve a new effect of depth and atmosphere by placing figures in different planes and by using a variety of heights of relief. The two great commemorative columns of Trajan and Marcus Aurelius from the 2d century A.D. in continuous bands spirally wound around the columns, narrate episodes in the military campaigns of the two emperors. Late works, like those on the Arch of Constantine (Arcus Constantini, dedicated in 315 A.D.), often frankly renounce classic naturalism, and revert to early Mesopotamian conventions of squat proportions for the human figure and simple superposition to indicate space. By classical standards these works would be judged bad; they have, however, a certain rough vigor and fitness to use and material all their own.

Portraiture was ever important to the Romans, who employed portraits in their cult of ancestor worship. Nearly all Roman portraits, one feels, were good likenesses. Many are masterpieces. To single out a few: the Junius Secundus from Pompeii, the Augustinian princes in the Prado, several of the benign Emperor Trajan, and all of the wicked Emperor Caracalla.

Early Christian Sculpture.—Christians, as early as the 2d century, adopted the regional pagan styles, modifying pagan elements to their own use. They seldom made statues in the round but employed relief extensively on marble sarcophagi. Of these many are known, and the research of scholars has shown that the great variation in type and style among them was due to the different provincial centers of production, as well as to period. Allegory and symbolism were much used: as the Good Shepherd standing for Christ, or vineyard scenes which symbolize the sacrificial wine. Scenes from the Old and New Testaments were frequent and were important because they helped to fix the representation of these subjects in the classic tradition, however diluted that tradition had become. These sarcophagi date largely from the 3d through the 5th centuries.

By the beginning of the 6th century the invasion of Teutonic tribes had so disrupted the way of life in western Europe that one must turn to the Eastern Roman civilization, with its center at Constantinople (or Byzantium), to follow the development of sculpture. There the production was intermittent because of a widespread tendency to regard "the graven image" as a sign of paganism. The sculpture of the Byzantines, however, was important, for it kept alive the plastic inheritance of antiquity for medieval Christianity. Typical are the small devotional plaques of ivory carved with religious subjects. Most of these are from the 10th and 11th centuries, though earlier examples exist.

In western Europe the history of sculpture resumed importantly about the year 1000 A.D., when the bronze doors on the Cathedral of Hildesheim, Germany, were made for Bishop Bernward. The Biblical scenes here have a feeling of life and intensity which augurs the great medieval art to follow.

Romanesque.—Romanesque sculpture exhibits the renewed vitality of Western culture in the 11th and 12th centuries. A factor, highly favorable to its development, was that sculpture at this time was eminently useful. Nearly all Romanesque sculpture was for the embellishment of churches and sacred objects. It follows that most of it is in relief, be it in the stone of which the churches were built, or be it in the gold or bronze or wood of the object it adorned and gave meaning to. As far as naturalism and limitation of technique are concerned, there is a certain analogy between Romanesque and Greek archaic sculpture, but the differences in subject, purpose, and emotional content are most marked. The Romanesque sculptor distorted the human figure and made unnatural patterns in his draperies, not so much for expression, but to coerce his designs into the shapes of capitals, or columns, or to run along the bend of a bishop's crozier. Superb examples of the architectural sculpture are to be seen in many parts of France; notable are the portals of Saint Pierre at Moissac, the church at Souillac, and the façade of St. Trophime at Arles. A variation of the French work may be seen in a portal at Santiago de Compostela in Spain. In Italy, the Baptistery at Parma is outstanding. Bronze work of the period is well represented in a series of Italian doors at Trani, Monreale, Ravello, Pisa, and Benevento. Many of the Italian works bear the signature of the artist.

Gothic.—Gothic sculpture was the product of an age still intensely religious but which manifested a new, broader outlook. Signs of this are perceptible in religious practices and reflected in art. The more austere, older monastic orders were losing favor while the new orders of friars, the Franciscans and Dominicans, gained enthusiastic following. The Dominicans, a preaching order, exhorted people to choose the good way of life, and stamped out heresy. The Franciscans by their humility and simple faith showed people how to live in the way of Christ. Both orders appealed directly to the individual man. Religion was humanized. Accompanying these changes came the development of a new mode of everyday life. Trade from region to region, from one nation to another, began to replace an almost completely local economy. Banking developed. People traveled more, and villages grew into towns. A middle class of merchants and artisans was born.

The reflection in art of these changes was profound. In Romanesque times the greatest buildings were monastic, built for monks with funds from the nobility; the glory of the Gothic period lay in its great cathedrals, built in towns and paid for largely by burghers. Sculpture became more natural to keep pace with the increased importance of the individual man, and to portray the new intimacy and tenderness of religion. This is shown in many ways. Sculpture used architecturally became more independent of the restrictions of its architectural placement, and began to create space in which figures could move. Portraiture gradually developed so that by the end of the period fairly convincing likenesses were made. Innovations in facial expression and gesture met the new demands for emotional characterization. In a way, even the subjects became more natural. The dominating Romanesque theme of Christ the Ruler gave way to the representation of the Madonna and Child, which offered the artist much greater opportunity to express the very human relationship of mother and child.

The dating of the Gothic period is complicated: the 13th and 14th centuries comprise the heart of the period, but because of the continuation of the Gothic style in architecture into the 15th and even 16th centuries, the terminal date is ambiguous, and it varies in different regions.

France was the cradle of Gothic art and it is to that country that one must turn to see the finest of Gothic work. There most of the medieval cathedrals have splendid sculpture. One might single out for examples of the early 13th century the central portal of the west façade of Amiens with its rows of lifesize patriarchs and apostles flanking the doors, between which is the gracious figure of Christ Blessing (*le Beau-Dieu*). Above is a large relief of the Last Judgment enframed in a series of pointed arches bearing over 100 figures. The portal of the south transept at Amiens illustrates the greater naturalism of the later 13th century. The central figure is the Madonna and Child (known as *la Vierge dorée* because the limestone statue was originally covered with gold leaf). Other particularly fine works of the 13th century may be seen on the south porch at Chartres, the west façade of Reims, and the portal of the south transept at Strasbourg. The 14th century produced portraits which were increasingly lifelike, but otherwise the greater naturalism has a tendency to waste itself on details of costume and rather over-elegant poses and expressions. The *Virgin of Paris* in Nôtre Dame is a typical illustration.

Not without French influence, but with more powerful individualization, are the finest of German works of the 13th century, such as the statues of the 12 benefactors of the Cathedral of Naumburg. English sculpture, although likewise strongly under French influence, lacked the vitality and distinction of the continental work. Something of the same might be said of Spanish Gothic.

Only in Italy during this period was there a strong native style that long resisted French influence. There on the Arch of Frederick II at Capua (1234) antique models were so ably employed that the heads and busts seem almost Roman. Out of this south Italian school came Nicola Pisano (1220–1284) whose hexagonal pulpit (1260) in the Baptistery of Pisa combined the imitation of the antique with a keen rendition of actual life. His son, Giovanni Pisano (1245–1314), probably under French influence, produced pulpits and Madonnas of high emotional content and increased realism. The great master of the next generation was Andrea Pisano (1270?–1348) a Florentine, not related to the above. His master works were the parcel gilt bronze doors now in the south portal of the Baptistery of Florence. Andrea's work is closely related to that of the painter, Giotto (1276?–?1337), in its combination of telling naturalism and measured restraint.

The Renaissance.—Renaissance sculpture in most respects is simply a continuation of the Gothic with certain tendencies of the Gothic accentuated. On the whole, one might say the same of the contemporary civilization. As trade, manufactures and cities flourished, so likewise did the independence of the individual increase. The burgher had to exercise his personal judgment and taste in the wares he made or bought, so, too, did he in the art he ordered. Out of this the individuality of the artist emerged, for the patron would seek out that artist whose style and expression pleased him most. The growth of trade encouraged inventions and discoveries. The same spirit was manifest in art: the laws of perspective were worked out, bodies were dissected to learn the secrets of anatomy, and treatises on techniques and the nature of art appeared. By 1500 most of the means for attaining naturalism had been explored and were available to an artist like Leonardo da Vinci. With the emergence of the individual, men developed the right to entertain their own opinions on beliefs hitherto accepted dogmatically. One manifestation of skepticism affected religion and produced reformations, both heretical and within the Catholic Church. Another manifestation, bolstered by a much increased knowledge of the writings and art of the ancient Greeks and Romans, influenced the subject matter and style of art. It is in this classical influence that one finds the most distinguishing characteristic of art of this time. Indeed the term Renaissance, literally "rebirth," means the rebirth of antique learning and forms.

The Renaissance may be taken as comprising the 15th and 16th centuries. In Italy the 15th century is known as the Early Renaissance; the first generation of the 16th (roughly 1500–1530), the High Renaissance; and the remainder of the 16th, the Late Renaissance. In the rest of Europe the new classicism did not prevail until the 16th century. The factor of classicism in Renaissance art is Italian, but the emphasis on individuality and the development of naturalism, which were equally important factors, were common to all of western Europe.

It may be affirmed that the first true Renaissance

art was in the field of sculpture. In 1401 the Merchant's Guild of Florence held a competition to choose a sculptor to make another set of bronze doors for the Baptistery of Florence, to match those of Andrea Pisano. The trial panels (preserved in the National Museum, Florence), of Lorenzo Ghiberti (1378–1455) and Filippo Brunelleschi (1377?–1446), representing the Sacrifice of Isaac, both reveal the major aspects of the new style: interest in the anatomy of the nude human body, a rich play of emotional expressions, a variety of poses in orderly but complicated compositions, and direct influence from antique sculpture. Ghiberti went on to do the portals (1403–1424) and still another set, the so-called "Gates of Paradise" (1425–1452).

The most versatile and most powerful sculptor of the first half of the 15th century was Donatello (1386?–1466) a Florentine, who exploited all techniques of sculpture in producing reliefs and statues which run the gamut of emotional expression from the delicate meekness of the *Annunciation* in Santa Croce and calm assurance of his great equestrian bronze statue of Erasmo da Narni, called Gattamelata, in Padua, to the profound pathos of the starkly realistic *Zuccone* on the Campanile and the wooden *Magdalen* in the Baptistery. A somewhat younger contemporary, Luca della Robbia (1400?–1482) fashioned his *Singing Gallery* for the Cathedral of Florence with delicate realism. Luca also introduced the new technique of colored, glazed terra cotta in which he did many beautiful works.

In the second half of the 15th century, Florence produced much sculpture of outstanding quality. Notable are the exquisitely sensitive marble reliefs of Desiderio da Settignano (1428–1464). Antonio Rossellino (1427?–1479) and Benedetto da Maiano (1442–1497) followed the same path. The outstanding sculptors of the time, however, were the realists, Antonio Pollaiuolo (1429–1498) and Andrea del Verrocchio (1435–1488). Pollaiuolo is credited with being the first modern artist to dissect the human body. His remarkable ability to use anatomy as an expressive vehicle is seen in the bronze statuette group, *Hercules and Antaeus* in the National Museum at Florence. Verrocchio, the master of Leonardo da Vinci, followed Pollaiuolo in mastering anatomy and extended its application in the field of facial expression as illustrated in his psychologically charged bronze group of *Christ and St. Thomas*. A supreme example of his dynamic realism is the bronze equestrian statue of General Bartolommeo Colleoni in Venice. The greatest sculptural achievement of the Early Renaissance was in Florence, but other regions of Italy also produced great masters: Jacopo della Quercia (1378?–1438) of Siena was a worthy rival of Ghiberti and Donatello; the Dalmatian, Francesco da Laurana (c.1420–c.1503), produced busts of esoteric beauty; the Venetian, Antonio Rizzo (1430?–?1498), combined Florentine features with German expressiveness; and the Emilian, Guido Mazzoni (1450–1518), produced dramatically realistic works in painted terra cotta.

Fifteenth century sculpture in northern Europe and Spain, like the Italian, developed realism in various ways. This is seen clearly in the work of Claus Sluter (d. 1406), a Dutch-Burgundian, at the very beginning of the century. His limestone *Well of Moses* (1395–1403) at Champnol near Dijon, represents four prophets so realistic in type and pose that they seem to have just stepped out of one of the contemporary mystery plays. The same feeling of actuality was carried by a Dutchman, Nicolaus Gerhaert of Leyden (c.1430–1473) into southern Germany. German sculptors continued the trend of dramatic grouping and intensified the emotional content of their figures, both in wood and stone. Significant artists were Veit Stoss (1440?–1533) with his *Shrine to the Virgin* (1477–1487) for the Marienkirche in Cracow, Adam Krafft (Kraft, 1450/55–1508/9) with many works in Nürnberg, and Tilman Riemenschneider (1460?–1531) whose dreamy, melancholy work is best seen in Würzburg. Netherlandish and German artists carried their traditions to Spain where there was an almost insatiable demand for ecclesiastical sculpture. French sculpture followed in the course laid down by Claus Sluter at Dijon with modifications tending toward quiet restraint. This is illustrated in a series of depictions of the Holy Sepulcher, of which a typical example is in the Hospital at Tonnerre (1454). Toward the end of the century Italian influence, especially in the use of classical ornament, appeared in the work of Michel Colombe (1430?–1512).

The High Renaissance in Italy was characterized by a markedly increased influence of the antique not only in types and details such as headdress and draperies, but even in the measured naturalism of classicism. This is illustrated in the sculpture of Andrea Sansovino (1460–1529) whose tombs of the cardinals Girolamo Basso della Rovere and Ascanio Sforza in Santa Maria del Popolo, Rome, imitating the form of the Roman triumphal arch, have figures of classic quiet and beauty. His pupil, Jacopo Tatti, also called Sansovino (1486–1570), continued the same trend in Venice. But the outstanding sculptor of the period, and indeed of the entire Renaissance, Michelangelo Buonarroti (1475–1564), did work too powerful and too varied in its expressiveness to be categorized so simply. His early works such as the *Bacchus* (about 1500) and *David* (begun 1501), both in Florence, show him conquering the problems of anatomy. His use of the nude in these statues is chiefly for the expression of realism. His *Moses* (San Pietro in Vincoli, Rome) and the *Bound* and *Dying Slaves* (Louvre, Paris), the only important finished parts of his great tomb for Pope Julius II (begun 1505), exhibit his mature mastery of anatomy to express diverse human emotions. The *Moses* with superhuman strength springs forward in wrathful indignation. The *Dying Slave* resigns his earthly life for the sweet sleep of death. Both works are pure poetry with every element in each, working to produce the desired effects in greatest intensity. Michelangelo's later Medici tombs in San Lorenzo, Florence (1520–1534), reveal other, equally powerful, variations of his mastery of the human body. The poses are forced and proportions are exaggerated but one would not call the figures unnatural. In his latest works (after 1550), however, Michelangelo severely distorted the human body to express his soul's anguish as in the *Pietà Palestrina* (Academy, Florence), a group of the Virgin and Mary Magdalen supporting the impossibly heavy body of the dead Christ.

Sculpture of the Late Renaissance in Italy followed two paths: one which exaggerated Michelangelo's use of pronounced muscles, twisting poses and elongated figures; and the other which more clearly was inspired directly by the antique. The Michelangelesque manner was used mostly for large works: architectural sculpture, fountains, public monuments and tombs. The classicizing tendency was pronounced in garden sculpture and bronze statuettes. Important sculptors of the period

were Il Tribolo (Niccolò Pericoli 1500–1550), Benvenuto Cellini, famous as a goldsmith (1500–1571), Bartolommeo Ammanati (1511–1592), the Italianized Fleming, Giovanni da Bologna (Jean Boulogne, known as Giambologna, 1529?–1608), and the Venetian, Alessandro Vittoria (1524–1608).

Italian influence in northern Europe and Spain was spread by traveling Italian sculptors, by foreign artists who completed their studies in Italy, and by a lively trade in exporting Italian sculpture especially around the western Mediterranean.

For Spain, the Florentine, Domenico Fancelli (1469–1519), did many monuments including the marble tomb of Ferdinand and Isabella in the Cathedral of Granada. Among other Italians who worked in Spain later in the century was Leone Leoni (1509–1590). Some of the best Spaniards were trained in Italy, notably the great painter-sculptor Alonso Berruguete (c.1486–1561), a pupil of Michelangelo, who in some ways anticipated the intense manner of El Greco.

The Frenchmen, Jean Goujon (1510?–?1568) and Germain Pilon (1537?–?1590), influenced by Italian artists working for the French court, produced statues and reliefs which were nevertheless quite French in their elegant grace. Goujon's decoration of the Louvre and the *Fountain of the Nymphs,* both in Paris, are typical.

Germans continued their own earlier vigorous tradition modified by a limited amount of Italian influence. This is seen in the bronze work of Peter Vischer (1460?–1529) in his *Shrine of St. Sebald* in Nürnberg, and with more Italian traits, in the work of Peter Flötner (c.1485–1546) and Konrad Meit (c.1480–c.1550) of the same period.

Baroque Sculpture.—Baroque sculpture of the 17th and 18th centuries, despite its essential architectural function, was replete with lively movement and pictorial in nature. Figures moved, flew, or were contorted in agony. Abundant draperies fell in tortured folds or were swept by the wind. Figures in histrionic poses were made more dramatic by vivid light and dark contrasts produced by pronounced undercutting or deep indentations.

The greatest master, one whose work sums up the chief characteristics of the period, was Giovanni Lorenzo Bernini (1598–1680). His great *Shrine for St. Peter's Chair,* his huge, bronze *baldacchino* over the high altar, his theatrical tombs for Urban VIII and Alexander VII, together with sculpture of the same nature by followers, give life and vigor to the interior of St. Peter's in Rome. The impressive colonnaded piazza in front of the same basilica was also designed by Bernini and embellished with 140 colossal statues from his studio. His many fountains of fanciful design, such as those of the Piazza Navona, help to give Rome its unique character. His theatrically conceived Cornaro chapel in Santa Maria della Vittoria, Rome, with its *Vision of Santa Teresa,* is a masterpiece which magnificently defies all the logical properties of stone. Bernini's portrait busts, for example that of Louis XIV (at Versailles), are realistic, intensely alive, and at the same time grandiloquent in pose and exaggeration of drapery. The prestige of Bernini and the force of his art were so great that his style was imitated not only by his contemporary rivals such as François Duquesnoy (1594?–1642) and Alessandro Algardi (1602–1654), but by most Italian sculptors through the greater part of the 18th century. The famous *Trevi Fountain* in Rome, for example, was done by Pietro Bracci (1700–1773) following a drawing of Bernini.

French baroque sculpture, like the painting of the time, maintained a stronger element of the classic than the Italian. Nevertheless, Bernini's influence was felt. Antoine Coysevox (1640–1720) and François Girardon (1628–1715) produced classicizing garden and fountain sculpture for the park at Versailles, dramatic tombs for the regent cardinals (that of Richelieu by Girardon, that of Mazarin by Coysevox), and lifelike portrait busts somewhat in Bernini's flamboyant manner. Their decorative reliefs in the Louvre and at Versailles also manifest influence of the great Italian. Though France produced no sculptor of quite the rank of Bernini, the quality of French baroque sculpture was remarkably high, especially in the 18th century. Guillaume Coustou (1677–1746), Edmé Bouchardon (1698–1762), Jean Baptiste Lemoyne (1704–1778), Jean Baptiste Pigalle (1714–1785), Étienne Maurice Falconet (1716–1791), Jean Jacques Caffiéri (1725–1792), Augustin Pajou (1730–1809), and Claude Michel, called Clodion (1738–1814), were all so equally good in a wide range of subjects that it is difficult to single out any one of them as outstanding. Their sensitive and refined, yet lively, works, are so imbued with naturalism that they seem almost timeless.

German baroque sculpture drew inspiration from both France and Italy, but was essentially German in its nervous energy and powerful forms. This is seen in the equestrian statue of the great elector in Berlin by the Italian trained Andreas Schlüter (1664–1714). More of the classical, French taste is perceptible in the New Market Fountain by Georg Raphael Donner (1693–1741) in Vienna. But the most characteristic phase of sculpture of the period is the rich decoration of palaces and Roman Catholic churches by countless wood carvers and masters of stucco. Superb examples may be seen in the Church of St. George at Diessen and in the pilgrimage Church of Vierzehnheiligen.

Spanish sculpture was almost independent of the pervading influence of Bernini, but was indebted, as was Spanish painting of the time, to the great Italian realistic painter, Michelangelo da Caravaggio (c.1565–1609). The characteristic medium was wood, painted most realistically. Important carvers were Gregorio Fernández (1566–1636), Juan Martínez Montañés (1568–1649), Alonso Cano (1601–1667), and Pedro de Mena (1628–1688).

The 19th Century.—Neoclassicism, which had been developing during the second half of the 18th century, was, in part, a reaction against the excesses of the baroque. In part, it was the result of a new wave of enthusiasm for the classic which had been aroused by the rediscovery of Pompeii (1748) and Herculaneum (1737), cities buried by the ashes and volcanic mud of Vesuvius in the 1st century A.D. Knowledge of the startling discoveries was spread by detailed catalogues and engraved plates. Scholars, notably Johann Winckelmann (1717–1768), and amateurs analyzed ancient art. The qualities which they found admirable in antique art became the basic principles of neoclassicism. Idealization, or generalization, replaced realism. Classic repose supplanted baroque agitation. "Noble simplicity," a catch phrase from Winckelmann, became the cardinal principle of all art. Under its authority the rich compositions, the high emotional content, and the vivid contrasts of light and dark of the baroque, were condemned. Sculptors turned to Greek and Roman statues and reliefs as models of perfection

SCULPTURE

"Sleeping Faun" by Edward Clark Potter.

"Orpheus and Eurydice" by Rodin.

The Metropolitan Museum of Art

"Memory" by Daniel Chester French.

SCULPTURE

"Pauline Francis" by Paul Manship.

"Hand of God" by Rodin.

"Mother" by Arthur Lewin-Funcke

The Metropolitan Museum of Art

to be emulated. Classical togas and classical nudity replaced the representation of contemporary costume. And classical subjects, particularly of the noble deeds of heroes from ancient history and mythology, became favorite themes, wrought with meaning to the educated people of the time, and impressive even to the illiterate.

Because of its development of philosophy, the natural sciences and religious skepticism, the 18th century is often known as "the age of reason." To people of such a period it was only natural that art which could be reduced to principles, a rational art, would be appealing. But the 18th century was also a period with a strong vein of what might be called the irrational: modern romanticism was then a flourishing infant, and sentimentality was rife. To the romantic and the sentimentalist the new classicism also appealed. People began to lead a kind of masquerade life. By 1800 women dressed their hair in antique coiffures and dressed their bodies in antique costumes. People went to church in Greek temples and lived in rooms furnished in imitation of Pompeii. There was an identification between the new republicanism of France and America and the republicanism of ancient Rome and the democracy of Athens that gave a deep sentimental meaning to the use of the classic in art. There was no questioning the suitability of Roman architecture for Washington, the capital of a new republic. Later, Napoleon with his new empire, found the same kind of parallel with imperial Roman art.

Neoclassic art varied little from country to country; adherence to its rigid standards permitted little latitude even for the personal expression of the artist. It is not surprising then that the two most admired sculptors of the style came at its inception, that both had practiced in the old baroque-rococo tradition. In France, Jean Antoine Houdon (1741–1828) was one of the greatest of all portrait sculptors. All of his portraits are so infused with life that they tell us not only what people looked like but what they were. Such a work is the head of Benjamin Franklin in the City Art Museum, St. Louis, from 1778. Such also are the *Seated Voltaire* in the Comédie Française, Paris, and the statue of Washington (1785) in the State House at Richmond, Va. Realism in portraiture, because of the sanction of that factor provided by realistic Roman examples, continued from the baroque into the neoclassic. About 1780, however, signs of greater quietness of pose appear, and often, as in the *Seated Voltaire* done at that time, the garb is classic. At the same time Houdon did his most famous nonportrait work, the marble *Diana* of the Hermitage in Petrograd (a terra cotta version is in the Frick Gallery, New York), which is not only classic in subject but likewise classic in facial type and the idealization of anatomical features. The second great imitator of the style in sculpture was Antonio Canova (1757–1822), whose international fame made Rome the mecca of younger sculptors. He adopted neoclassic tenets after moving to Rome from Venice in 1779. Since he did relatively few portraits, the variety of his work is much greater than Houdon's. Canova left many tombs, from small, delicately executed stelae to the huge pyramidal tomb of the Archduchess Maria Christina in Vienna, with its allegorical procession showing that all paths lead but to the grave. His best known work is the sentimental group, *Cupid and Psyche,* in the Louvre, which seems to have been inspired by a painting from Herculaneum. His huge, and powerful, bronze statue of Napoleon as Mars (in the court of the Palazzo Brera, Milan) is typically neoclassic in its allegory and nudity. A third inaugurator of neoclassicism was the Englishman, John Flaxman (1755–1826), who was more famous for his decoration of Wedgwood pottery and his linear drawings than for large-scale sculpture. Already as early as 1775, when he began to work for Wedgwood, his manner was completely neoclassic. Another early practitioner of the new style was the German, Johann Heinrich von Dannecker (1758–1841), whose sculpture resembles Canova's. More original was Johann Gottfried Schadow of Berlin (1764–1850), who decorated the Brandenburg Gate in Berlin with rather dry neoclassic sculpture, but whose work in general, like the portrait group of the *Crown Princess Louise and her Sister* (Berlin), exhibits an admirable balance between naturalism and classic grace. The Dane, Bertel Thorvaldsen (1768–1844), enjoyed a reputation second only to that of Canova in his own day. His rhetorical variations of classical forms and themes are perfect examples of the vacuity of expression, which, alas, was all too frequent in neoclassic art and which is felt in the work of countless sculptors in the first half of the 19th century.

By about 1830 many sculptors began to deviate from the strictures of neoclassicism. Lorenzo Bartolini (1777–1850) preached unmitigated realism, but carved figures, as in the public Monument to General Demidov (Florence), which preserve neoclassic costume and nudity and have only a mild infusion of naturalism. Though he himself could not attain realism, Bartolini in 1842 gave unstinted praise to the starkly lifelike statue, *Abel* by Giovanni Dupré (1817–1882), whose works were inspired by nature and Early Renaissance sculpture. In France, François Rude (1784–1855) respected the neoclassic credo but could not stay within its bounds. As early as 1833 his *Neapolitan Fisher Boy* was hailed by some critics as romantic in subject and realism. His famous *Departure of the Volunteers* on the Arc de l'Étoile, Paris, used classical types and costumes but was quite opposed to the neoclassic in its intensity and movement. A greater break from his neoclassic training was made by Antoine Louis Barye (1795–1875) in 1831 when he exhibited the *Tiger Devouring a Crocodile* (in the Louvre) which was not only vividly realistic, but of a kind of subject outlawed by neoclassicism for monumental art. In 1837 Barye, rebuffed by the classicistic critics, began to produce statuettes, candelabra, clocks, etc., using his favorite motifs of wild animals. In the 1850's he returned at times to classical themes like the *Centaur and the Lapith* (Museum of Puy) but not to a neoclassic manner.

By 1850 neoclassicism was moribund. Young sculptors were no longer fettered by its principles and strictures. Instead, they turned to nature directly or drew inspiration from the great masters of the Renaissance and baroque periods. The Englishman, Alfred Stevens (1818–1875), though he studied for a year with Thorvaldsen, was never a neoclassicist. His decorative sculpture for Dorchester House in London (1858–1862) reminds one of the full-bodied figures and expressive poses of Michelangelo. His monument of the duke of Wellington in St. Paul's Cathedral, London, is one of

the sculptural masterpieces of its century. A nephew of François Rude, Emmanuel Frémiet (1824–1910), following the lead of Barye, devoted his talents chiefly to the modeling of animals. His most lasting success derives from a notable series of bronze equestrian monuments, such as the *Joan of Arc* in the Place de Rivoli, Paris, which, while meticulous in realism of anatomy and historical trappings, avoids the triteness of many of his other works. Of a surer taste are the exuberant, energetic works of Jean Baptiste Carpeaux (1827–1875) inspired by the spirit of 18th century French art. To appreciate Carpeaux to the full one should look at the terra cotta *Flora* (in the Louvre) and the plaster model of the *Dance* (in the Louvre) rather than the marble version on the façade of the Opéra. Paul Dubois (1829–1905), after a sojourn in Florence, adopted features of Early Renaissance sculpture. The delicacy and spirituality of that period appears in his bronze *Young St. John the Baptist* (Luxembourg Museum, Paris). Jules Dalou (1838–1902), who in his full forms and salubrious carnality reminds one of his contemporary, the painter Renoir, revoked the spirit of Rubens in great bronze groups of Silenus (Luxembourg Gardens, Paris), and the Republic (Place de la Nation, Paris). The German, Reinhold Begas (1831–1911), also drew inspiration from the rich fancy of baroque art in his fountain near the Royal Palace in Berlin. His work lacks the vitality of Dalou.

(François) Auguste Rodin (1840–1917) was the outstanding original genius of French 19th century sculpture. He used stark realism at times, he borrowed extensively from the art of the past, and he was a modeler who gave his plaster models to be reproduced by others in marble or bronze. Yet, though he had these things in common with nearly all 19th century sculptors, his work from the beginning rang as new and different. In modern sculpture, Rodin almost by himself, occupied a place as forerunner parallel to that of the entire group of Impressionists and Post-Impressionists in the field of painting. When shown in the Paris Salon of 1877, Rodin's first important work, the *Age of Bronze,* was taken to have been a cast from the body of a living man. It and his *Preaching Saint John the Baptist* (1879) may be considered the pre-eminent realistic statues of the 19th century. In them one detects influence from Donatello's late work in the exalted expressions and broken surface treatment. In 1879 Rodin began a huge portal with many figures and reliefs known as the *Gate of Hell,* which, though never completed, served as a source of themes for many of his later works, including his best known creation, the *Thinker,* a tribute of his admiration for Michelangelo. In his latest sculpture, like the statue of Balzac, Rodin exaggerated nature much like the great cartoonist, Honoré Daumier (1808–1879). The power of his figures and the poetic, emotional content of his works won Rodin fame in his day, but his enduring fame will rest rather on his realization of sculptural form as expressed in the myriad of telling outlines generated by any one of his mature works, and in the almost musical harmony produced by the undulation of his modeling as forms move into each other to create a whole Also, in spite of the fact that Rodin's models were put in stone or bronze by others, the finished works manifest a new sense of fitness to their materials even when, like the *Thinker,* they were reproduced both in bronze and marble. The Musée Rodin in Paris houses the sculptor's original casts.

A German sculptor, Adolf von Hildebrand (1847–1921), was second in importance to Rodin in affecting the course of 20th century sculpture. Hildebrand's approach to sculpture was intellectual; indeed at times so calculated that much of his work lacks the intuitive spark of inspiration which one demands in art. He turned from realism and baroque turbulence to Greek repose, even seeking impassivity of expression that he might accentuate formal qualities. His marble *Male Nude* (National Gallery, Berlin) from 1883 to 1884 is the most characteristic incarnation of his theories. The head is merely one of the anatomical details of the figure. While natural in proportion and relationship, the parts of the body and head were simplified and resolved into essentially geometric forms. The relationship of the figure to the block of marble from which it was carved was made evident to emphasize the nature of the material, to produce the desired glyptic (or stonelike) quality. Surfaces were smooth to enhance the beauty of the material.

The 20th Century.—At the very beginning, 20th century sculpture was revolutionary, especially in France, where the genius of Rodin had created new concepts of the nature of sculpture. What the younger artists learned from Rodin was, above all, that the essence of sculpture derives from the relationship of masses to masses, and then from the outlines generated by those masses. Hildebrand was also influential in his classicism with its insistence on repose; in his tending to geometrize which led to the simplification—or abstraction—of nature; and in his emphasis on respect for the nature of the materials used for sculpture. In respect for materials, Hildebrand's influence coalesced with more important developments of the same line of thought that had occurred in the fields of architecture and the minor arts, and that had already had effect in painting, particularly in the painting of Eugène Henri Paul Gauguin (1848–1903).

Aristide Maillol (1861–1944), trained as a painter and self-taught as a sculptor, rebelled from Rodin's expression of movement, especially in surface treatment. His *Seated Woman* (in plaster about 1901, a marble version is in the Garden of the Tuileries, Paris) is quiet and massive with an emphatic definition of geometric form. The facial type, the smooth roundness of the modeling, and the simple, continuous outlines derive from ancient Greek sculpture of the early 5th century B.C. His later work follows in the same path: feminine figures in restful or heroic poses with reminiscences of Greek classic art. The work of Joseph Bernard (1866–1931) might be described in much the same terms, but Bernard, though not so well known as Maillol, far surpassed the latter in variety of subject and treatment, and also in infusing life into his figures. His bronze *Maiden with a Jug* (in the Luxembourg Gardens) has the musical rhythm of Greek work embodied in its simple, harmonious forms. Bernard's figures in marble manifest an extraordinary sensitivity to the medium. Their pagan sensuousness reminds one of the finest of Renoir's paintings of the nude. Bernard carved directly; that is to say, without the use of a clay or plaster model. Émile-Antoine Bourdelle (1861–1929) and Charles Despiau (1874–1946) were two other sculptors of the same general classicizing tradition, who retained a bit

more of Rodin's love of surface manipulation and admiration for Gothic sculpture.

In Germany the rationality of Hildebrand resulted in a development of powerful architectural sculpture, largely under the direction of the architect, Bruno Schmitz (1856–1890). For the latter, Franz Metzner (1870–1919) executed the highly stylized, and architecturally controlled, sculptural decorations of the Leipzig Monument of the Battle of Nations (1906–1913). A pupil of Metzner, the Yugoslav, Ivan Meštrović (b. 1883) enlivened and enriched his master's architectural stylization with motifs and energy inspired by Michelangelo and Rodin. The most talented German sculptor of the first generation of the century was Wilhelm Lehmbruck (1881–1919), a pupil of Maillol, whose *The Kneeling Woman* (a cast stone version is in the Museum of Modern Art, New York), like most of his figures, combines classic repose and medieval elongation with most expressive results.

In England the American born Sir Jacob Epstein (1880–) has practiced in two distinct manners, one for bronze and quite another for stone. His works, therefore, are interesting examples of the 20th century sculptor's sharp distinction between modeling and carving. Epstein's bronzes, like those of the elderly Donatello whom he admires, are rough in surface and exaggerate natural forms, yet produce an effect of realism. His *Madonna and Child*, and the *Risen Christ* (both in the Tate Gallery, London) are outstanding examples of modern religious art. Epstein's stone sculpture, simple in outline and smooth in surface, has the qualities of direct carving.

Adolf Gustav Vigeland (1869–1943), whose work is seldom seen outside his native Norway, was perhaps the most original of Rodin's disciples. His manipulations of special effects have interested younger sculptors in many lands. Carl Milles of Sweden (b. 1875) has been unequaled in the production of large-scale decorative sculpture in bronze. The power and charm of his work may be appreciated in numerous works at the Cranbrook Academy, near Detroit, where he taught for several years.

All of the above leaders in sculpture of the 20th century insisted upon a respect for materials and all of them produced figures—chiefly of the human nude—which are recognizably natural but not realistic in the 19th century sense. A somewhat younger group of sculptors under the influence of cubism and later revolutionary developments, shunned naturalism and, to a great extent, the human subject. Pablo Picasso (b. 1881), one of the inventors of cubism, has made sculpture similar to his ever-changing painting since 1905. A bronze *Head of a Woman* (Art Institute, Chicago) distorts human features into angular cubic forms just as do his paintings from 1909. Within the next three years a number of youthful, traditionally trained sculptors followed the lead of Picasso. Raymond Duchamp-Villon (1876–1918), pupil of Rodin and influenced by Maillol and German sculpture, about 1912 renounced naturalism for abstraction. His bronze *Horse* (Museum of Modern Art, New York) from 1914 is an organically generated assemblage of geometric forms expressing the beat of a horse's hoofs as no naturalistic statue ever had. Umberto Boccioni (1882–1916), one of the founders of the Italian movement of futurism, transposed parts of the human body and used inexplicable applied or interpenetrating objects to produce effects of weirdness and movement. His *Unique Forms of Continuity in Space* from 1913 may be seen in the Museum of Modern Art, New York. Constantin Brancuşi (b. 1876), a Rumanian domiciled in Paris, while influenced by the abstract direction of cubism, was creating his own completely different abstractions as early as 1908. His repertory of geometric and organic creations is best studied in the Arensberg Collection of the Philadelphia Museum, which has, among others, his blocky and glyptic *The Kiss* from 1908, and three versions of his *Bird*. Hans (Jean) Arp (b. 1887), an Alsatian, has made smooth organic sculpture in the round similar to Brancuşi's but is especially known for his reliefs which often consist of nothing more than flat pieces of wood of squeezed ovoid outline, pasted to a board. Henri Laurens (1895–1954), a Frenchman, worked in much the same way but with added color and a variety of planes and shapes. The Russian born Aleksandr Porfirievich Archipenko (b. 1887) went to Paris in 1908 where within a few years he began to develop sculpture of cubist inspiration. His later work (since 1924 he has lived in the United States), lies between naturalism and abstraction. The Russian born brothers, Naum Gabo (b. 1890) and Antoine Pevsner Gabo (b. 1890) early developed cubism into opposing planes in space, then went on to produce purely nonobjective construction which resembles complicated mathematical projections, using wire, plastics, and other nontraditional materials. Jacques Lipschitz (b. 1891 in Lithuania) has been one of the most imaginative of French sculptors to evolve out of cubism. The variety of his forms and modes of expression are unequaled in 20th century sculpture. About 1930 his cubistic creations began to elicit weird, haunting effects. Since that time his sculpture has been largely representational in a fantastic vein. Though his work is usually in bronze his effects in the handling of that material are astonishingly varied. The Spaniards, Pablo Gargallo (1881–1934) and Julio Gonzalez (1876–1942), were important in establishing wrought iron as a medium for sculpture. Gonzalez, after working with Picasso about 1930, began to make constructions in an original fantastic vein. Italian sculptors, with the exception of Boccioni, worked in a simplified traditional manner until the 1930's, when Arturo Martini (1889–1947) and his pupil Marino Marini (b. 1901) evolved new expressive factors of distortion. Marini's weathered surfaces, and surface tensions, together with the Etruscan sepulchral aura which he creates, have brought him great fame.

Of all English sculptors of the century, Henry Moore (b. 1898) is most eminent. Influenced by Brancuşi, Picasso, and Epstein, his art is, nevertheless, highly original in its evolving forms and its recognition of the quality of materials. In the latter respect, Moore is unequaled, especially in the treatment of many different kinds of wood and stone. His favorite subject is the reclining female nude, represented abstractly with marked distortions The Swiss Alberto Giacometti (b. 1901) has attracted worldwide interest in his emaciated little figures of molten bronze, with which he creates extraordinary special effects by using a kind of horizontal relief setting.

American Sculpture.—Sculpture, recognized as art, did not exist in colonial America due to

the prejudice of militant Protestantism against the making of idols. In the 18th century, there were, however, anonymous carvers who made ship figureheads, weather vanes, and other objects which are now cherished as examples of folk art. With the birth of the new republic coinciding with a more broadminded concept of religion, there developed a real need for sculpture to commemorate heroism and to embellish monumental buildings. This need was first met by foreigners and self-trained artists. John Frazee (1790–1852), a stone-cutter, executed the first marble busts in this country. William Rush (1756–1833), a Philadelphia physician, with a modicum of instruction from the Englishman Edward Cutbush, carved ship figureheads which Benjamin Latrobe praised as peerless. He also carved busts and allegorical figures in wood. His best known work was the *Nymph of the Schuylkill,* preserved in a bronze replica in the Philadelphia Museum.

Young Americans, trained in Italy, were producing sculpture in a belated neoclassic style shortly before the middle of the 19th century. From that time on, sculpture in America followed the same general path of development as in Europe. Horatio Greenough (1805–1852) was the first academically trained American sculptor. He went to Rome in 1825, studied under Thorvaldsen, then in 1828 settled in Florence where he lived most of his life. His *Seated Washington* (now in the Smithsonian Institution), though a powerful, nobly conceived figure, became the butt of jokes because people in the 1840's, and especially Americans, could no longer regard as serious the portrait of a modern man as Zeus, naked to the waist. Hiram Powers (1805–1873) followed Greenough to Florence in 1837 and began to work in the same late neoclassic manner. Powers, however, enjoyed enormous success because his statues of the female nude combined the right amount of classic generalization with touches of realism to titillate, but not shock, contemporary taste. His *California* (in the Metropolitan Museum, New York) is a good example. Thomas Crawford (1813?–1857), after training in Rome, received commissions for the Capitol in Washington, D.C. His bronze *Armed Freedom* crowns the dome. Also he did the pediment of the Senate wing and the bronze doors of the Senate Portico. Another group of somewhat younger artists, including William Wetmore Story (1819–1895), Randolph Rogers (1825–1892), William Henry Rinehart (1825–1874), and our first prominent woman sculptor, Harriet Goodhue Hosmer (1830–1908), also studied in Italy and produced rather Victorianized neoclassic works almost to the end of the century.

In the meantime some other sculptors, as in Europe, adopted a more realistic attitude. Erastus Dow Palmer (1817–1904) infused life into neoclassic themes with a charmingly awkward naturalism and a caressingly soft handling of surfaces. Henry Kirke Brown (1814–1886), like his contemporary Emmanuel Frémiet in France, won fame for his equestrian monuments, of which the Washington (Union Square, New York) is his greatest achievement. John Quincy Adams Ward (1830–1910), a pupil of Brown, continued the latter's realistic approach with the harsh definition of steel engravings in a host of public monuments. Far the greatest of the realist trend was the Boston physician, Dr. William Rimmer (1816–1879), who demonstrated in words and in sculpture the clearest concept of the art. The vigor of his works, their organic coherence, and their realization of sculpture's multiplicity of outlines, make them rival the finest of Hellenistic sculpture. His *Falling Gladiator* of 1861 illustrates an early stage of his ability to transform a profound knowledge of anatomy into expressive form, an ability which reached a zenith in *The Dying Centaur* of The Metropolitan Museum of Art, New York. He also carved directly in granite a nobly tragic head of St. Stephen.

Sculptors of the last generation of the century went to school in Paris, where they acquired the more pictorial manner and eclectic qualities of their French masters. This is illustrated in one of the bronze doors of the Library of Congress building in Washington, D.C., modeled by Olin Levi Warner (1844–1896), and even in the work of the most famous American sculptor of the century, Augustus Saint-Gaudens (1848–1907). His first work after his return to America, the *Admiral Farragut* (1874) in Madison Square, New York, showed an inventiveness in design and a mastery of composition hitherto unknown in America. His statues of Lincoln, particularly the *Standing Lincoln* in Lincoln Park, Chicago, and his *Deacon Chapin,* or *The Puritan,* are so perfectly characterized and strongly presented that they have become part of America's visual heritage. His unequaled modeling in very low relief is readily appreciated in a series of bronze portrait plaques, of which those of Robert Louis Stevenson are best known.

Many sculptors in America, as elsewhere, carried the 19th century attitudes well into the 20th century. Daniel Chester French (1850–1931) continued, with great acclaim, a weak adaptation of Saint-Gaudens' style. George Grey Barnard (1863–1938) was more original. He, like Rodin, whose works Barnard's often resemble, was an admirer of Michelangelo. His early *Two Natures* (in the Metropolitan Museum, New York) was inspired by the great Italian but has Barnard's mysticism. The success of his heroic attempts to achieve monumentality may be judged in the two groups which flank the entrance to the capitol at Harrisburg, Pa. Another great personality, who like Barnard attempted the monumental, was Lorado Taft (1860–1936), known for his *Fountain of Time* (in the Midway, Chicago) and his colossal *Black Hawk* (in Oregon, Ill.) both in cast concrete. Cyrus Edwin Dallin (1861–1944) successfully adopted the realistic manner of Frémiet to the theme of the Indian on horseback. The same was done with more originality by Solon Hannibal Borglum (1868–1922), whose brother Gutzon Borglum (1871–1941) was one of the Americans inspired by Rodin. Gutzon will be remembered for the gigantic heads of national heroes which he carved in the living rock of Mount Rushmore, in the Black Hills of South Dakota. Jo Davidson (1883–1952) did portraits of great sensitivity in character delineation and in the handling of bronze. His marble *Japanese Girl* (Whitney Museum, New York) achieves a wistful poetic effect with very simple means.

Just before the outbreak of World War I an exhibition of European contemporary art was exhibited in the United States. The Armory Show, as it has been called, opening in New York City on Feb. 17, 1913, created a furore because it brought to the attention of Americans the most

advanced products of the cubists and other revolutionary artists. From this time on, whether an artist liked abstraction and distortion or not, he could not ignore their existence. Elie Nadelman (1885–1946) came to the United States from Poland in 1917, and remained. His extremely rounded doll-like figures are so simplified that, though usually not distorted in proportions, they produce strange, unnatural effects. Gaston Lachaise (1882–1935) was perhaps the first American sculptor to be considered an extremist in his deviation from naturalism. His *Floating Figure* from 1927 and *Standing Woman* from 1932 (both in the Museum of Modern Art, New York) exaggerated the female figure to achieve impressive heroic effects.

Paul Manship's (b. 1885) studies of the classic and Renaissance in Europe influenced his style. His work is characterized by conscientious craftsmanship and harmonious composition. He has done many bronze groups, like the *Dancer and Gazelles* (Corcoran Gallery, Washington, D.C.), which combine the human figure with animals. José de Creeft (b. 1884) and William Zorach (b. 1887) employ a simplified naturalism and emphasize the beauty of the material of their work, even seeking the effect that the material has generated the sculpture itself. Zorach has produced strongly modeled and emotionally effective works, especially in granites and other hard stones. John B. Flannagen (1898–1942), with similar aims, carved animals out of boulders. His *Triumph of the Egg* from 1937 is a genial specimen. Hugo Robus (b. 1885) is best known for the clever and effective *Girl Washing Her Hair* (Museum of Modern Art, New York) from 1933, which, while basically natural, is almost surrealist in effect. Alfeo Faggi (b. 1885) turned from a manner adapted from the early Renaissance to a kind of abstraction which seems almost Byzantine for his *Stations of the Cross* in Saint Thomas the Apostle, Chicago.

Robert Laurent (b. 1890) has turned from classical concepts similar to Maillol's to abstractions in which natural forms are stylized rather cubistically. Something of the same is true of the work of Berta Margoulis (b. 1907) and of Concetta Scaraglione (b. 1900), though a fine feeling for classic form and solidity has not disappeared completely in the latter's work. The strength and sensitivity of Dorothea Greenbaum (b. 1893) has also persisted through more modern stylistic phases. Among so many fine women sculptors (and there are others that space forbids consideration) perhaps the outstanding is Minna Harkavy (b. 1895) whose bronze *American Miner's Family* (Museum of Modern Art) is one of the most original and most expressive American works of art. Her much later, prize-winning *Two Men* from 1951 creates an aura of long past times in its powerful expression. William McVey (b. 1905) might be characterized as an abstracting naturalist who has come under the influence of Aztec sculpture. His figures, like *Vision Wichita,* are strongly rounded with textured, or sometimes almost weathered, surfaces. Chaim Gross (b. 1904) fits in no category. His blocky forms disclose a strange race of blocky girls in surprising poses.

A great number of the most talented American sculptors who developed in the 1930's have turned to extreme forms of abstraction, or even nonobjectivity. The oldest and most famous American extremist is Alexander Calder (b. 1898), the son of a well-known sculptor of the early part of the century, Alexander Sterling Calder. Young Calder went to Paris in 1936 where he made quite a reputation with his portraits in wire and his animated *Circus* with animals and acrobats cleverly constructed of wire and wood. Then about 1930, influenced by Pieter Cornelius Mondriaan (1872–1944), he designed three dimensional nonobjective compositions out of wire and sheet metal. These are called "stabiles." Soon he had worked out schemes for animating or giving motion to these creations. By 1932 the idea of his "mobiles" was realized, and Calder had made what is doubtless the most important contribution to nonobjective art of any American sculptor. A good example of a wind-turned mobile is his *Lobster and Fish Tail,* commissioned for the stairwell of the Museum of Modern Art in 1939. Many of the younger men were strongly influenced by the constructionists, especially by the work of Naum Gabo, who settled in the United States in 1947. The very geometric constructions of wire and rods by Richard Lippold (b. 1915) are usually pure examples of constructionism but sometimes Lippold inserts small figures which create a romantic, stage-set effect. Theodore J. Roszak (b. 1907) in the early 1940's did constructionist works influenced by Mondriaan and Alexander Calder, but later eschewed what he calls "a technological deity" in favor of savagely emotional creations of animal-like forms somewhat resembling the late work of Jacques Lipschitz. His medium is usually welded bronze. Somewhat similar, though more geometric and less emotional, is the work of David Smith (b. 1906). Experimenters in pure form, often biomorphic, are José Ruiz de Rivera (b. 1904), David Hare (b. 1917), and Ibram Lassaw (b. 1913). Isamu Noguchi (b. 1904), although an American and trained as an assistant by Brancuşi, makes designs which have a Japanese flavor. Some of them are for furniture. Herbert Ferber (b. 1906) worked in a manner influenced by Julio Gonzalez, then developed a peculiar, personal expression by composing thornlike bits of metal with almost anguishing effect.

There is no doubt that the meaning of sculpture must be extended to comprehend the constructional and biomorphic forms of the 20th century and the new materials and techniques which have been used to produce them. On the other hand, the representation of natural forms in a more-or-less traditional manner continues. There is need for both, and each may be fine in its own way.

See also AMERICAN ART; AMERICAN SCULPTURE; BRONZE AND BRASS IN ART; BUST; BYZANTINE ART; CARVING; CHINA.—*6. Art* (Sculpture); ECCLESIASTICAL ART; EGYPTIAN ARTS; FRANCE—*15. Art and Architecture;* GERMANY—*16. Art and Architecture;* GOTHIC ART; GREECE—*11. Greek Sculpture and Painting;* ITALY—*6. The Arts;* JAPAN—*16. The Fine Arts;* PERSIAN ART; ROME—*Material Development of the City and its Historic Buildings;* SPAIN—*12. Art* (Sculpture).

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SCUP, one of the names of an important American food-fish (*Stenotomus chrysops*) belonging to the family Sparidae, to which the sheepshead and snapper also belong. It is known among fishes inhabiting the same region by its deep body, prominent dorsal spines, and the canine-like teeth. The color is silvery gray with purplish reflections above, pure silvery on the sides below. This fish is abundant from Cape Cod to the Carolinas and reaches a large size on rocky ledges where food is abundant, though ordinarily not exceeding 9 or 10 inches in length; it reaches a remarkable size at the age of two years. In the South it is known popularly as porgy. Consult Goode, G. B., *American Fishes,* (New York 1888); Jordan and Evermann, *American Food and Game Fishes,* (New York 1902).

SCURVY, a disease resembling purpura, characterized by inanition, anemia, asthenia, ecchymoses and a tendency to swelling and bleeding of the gums. It is mainly due to disordered nutrition from improper food. Sometimes it follows a deficiency of fresh vegetables and fruits, or an excess of salt fish and pork, the use of tainted food, a too monotonous diet, or an insufficient amount of food. General ill health and malnutrition, and a cold, damp winter, compelling persons to house themselves, are predisposing causes. No condition of the blood differing from that found in other anemias has been recognized. Some believe that the disease is an infection because it has often spread rapidly in prisons, workhouses, etc., and sometimes has a distinct period of incubation, and because one attack, as a rule, confers immunity. It is not related to relapsing fever, which is contagious.

Up to the middle of the last century scurvy was frequent during wars, pestilences and famine, and especially on long sea-voyages when the diet consisted largely of bread, tea and salt meat. During the Crimean War 23,000 cases of scurvy occurred among the French troops alone, and in the American Civil War 15 per cent of the deaths were from this disease, though many cases recovered, owing to the use of vegetable food furnished by the Sanitary Commission. At the present time scurvy is comparatively rare, as most vessels going on long voyages are supplied with a variety of anti-scorbutics, canned meats, lime-juice, lemons, and other fruits, vegetables, etc., and on land, in civilized countries, or at least where hygiene is not rudimentary, fresh fruits and vegetables are more used than formerly.

In scurvy the blood coagulates poorly, its red corpuscles are diminished, while the white are increased in number. Sometimes there is edema of the feet and ankles and serous exudation into the pleural and large joint cavities. There are purpuric spots in the skin, especially on the legs, ecchymoses in the pleura, pericardium, cerebro-spinal meninges, synovial membranes and in the mucous lining of the bronchi and alimentary canal; and haematoma in muscles like the gastrocnemius and gluteus, which may suppurate or in part organize. The gums are swollen, especially about the teeth, and their deeper layers are thickened; fatty changes occur in the liver, spleen, kidneys and heart; the bones may be carious or fractured; and the bone-marrow and mesenteric glands may display hemorrhagic infiltration. In infants the ecchymoses are almost entirely subperiosteal, the blood raising the periosteum (usually of femur, sometimes of tibia or fibula, rarely of the bones of forearms or other parts) in a fusiform swelling, surrounding the bone. The bones become thickened and sometimes superficially necrosed. The epiphyses may separate. The gums may be spongy.

The symptoms of scurvy, which usually develop slowly, include lassitude, anemia, flaccidity of muscles, a cool, dry skin, with sometimes a yellowish pallor. When the disease is developed the gums are red, nodular or fungous, and bleed readily. When the disease is advanced, hemorrhage occurs internally or externally, the breath is offensive, the gums ulcerate, and the teeth loosen. There is thirst, with a craving for sour food and condiments; the joints are swollen and painful; syncope, dyspnoea, and pulmonary congestion are common; the urine is scanty, high-colored, and less than normally acid; the temperature is subnormal (96°F. or 97°F.). The patient is pale, feeble, much emaciated, mentally depressed, and may have low delirium and coma. Meningeal hemorrhage may cause convulsions or hemiplegia. In infants, over the inflamed periosteum there is intense pain and tenderness, swelling and a tense, shiny skin. The child screams when moved, loses appetite, emaciates, grows pale and feeble, perspires freely. There is usually diarrhoea, sometimes hematuria, hemorrhagic blebs in the pharynx, and extravasation of blood in the orbit. Other extravasations, however, are rare. The present day attitude is to regard scurvy as a disease due to the deficiency of certain ingredients in the diet. These are usually chemical or nitrogenous phosphorus compounds, often called vitamins.

SCUTAGE, or **ESCUAGE,** in the feudal system the fee on payment of which the military service due from the holder of a knight's fee was not exacted. It originated about the 11th century, and the irritation caused by its exaction was one of the causes that moved the barons to oppose King John in 1214. Consult Baldwin, J. F., *The Scutage and Knight Service in England* (Chicago 1897).

SCUTARI, (1) town, and (2) prefecture, in Albania, and (3) lake, partly in Albania and partly in Yugoslavia. The town, which the Albanians call Shkodër, is situated near the south-east end of the lake. It trades wool, hides, tobacco, and dried fish for foodstuffs, textiles, and metal goods, and manufactures cotton and firearms. In addition to its airport and ancient citadel, it has picturesque mosques, and a Roman

Catholic cathedral. Scutari figured for a time as capital of the ancient kingdom of Illyria, but was captured by the Romans in 168 B.C. During the middle ages it was held successively by the Serbians, the Normans, and the Republic of Venice. It was taken by the Turks in 1479, but from the middle of the 18th century its local rulers maintained virtual independence. After the Balkan Wars (1912–1913) it became part of the kingdom of Albania. Occupied by the Italians in 1939, it was freed by unified liberation forces by the end of 1944. Population (1930) 29,209. The prefecture of Scutari, with a population (1930) of 132,336, ranked fourth among the ten prefectures of the kingdom. The lake of Scutari has an area of about 135 square miles. In the north it receives the Morača; and it is drained from the southern end by the Boyana, which, being increased by the main current of the Drin, forms its outlet in the Adriatic.

SCUTARI, Turkey. See ÜSKÜDAR.

SCYLLA, sĭl'a, a character in mythology, the daughter of Nisus, king of Megara, who, when Minos came from Crete to attack Megara, in revenge for the death of his son, Androgeos, was led by her love for Minos to cut off from the head of her father, King Nisus, a purple lock of hair which while it remained on the head of Nisus made it impossible for Minos to take the city. Megara was captured and Nisus slain, and Scylla was either drowned or changed into a fish which Nisus, changed into an eagle, constantly pursued.

Also another Scylla, mentioned in the Odyssey, as a monster with 12 feet, six necks and six mouths, and occupying a rock on the Italian coast. Legends represent her as having been a beautiful woman changed into a monster through the jealousy of Circe or Amphitrite.

SCYLLA and **CHARYBDIS,** ka-rĭb'dĭs, the former a promontory of southern Italy, at the entrance of the strait which divides Italy from Sicily. Navigation around this promontory was considered dangerous by the ancients, but is regarded by moderns as not attended by special difficulty. Charybdis is a whirlpool nearly opposite the entrance to the harbor of Messina in Sicily, the navigation of which is regarded as very dangerous even to vessels of the present age and which must have been extremely perilous in ancient times. "Between Scylla and Charybdis," means to be confined to a choice between two dangerous situations.

According to the Odyssey (xii, 73ff.) these were two sea monsters, personifying the dangers of rocks and eddies. A description of Scylla is given under that heading. Charybdis sat opposite her, on a low rock under a fig tree, sucking in and belching forth, thrice daily, the adjacent water. In the *Alexandreis* of Gautier de Lille occurs the famous line, "Incidis in Scyllam cupiens vitare Charybdim."

SCYTHIANS, the writers of the Classic Age confounded under this name several peoples, who dwelt from the present Rumania to the Pamir across middle Russia and the Caspian steppes. However, the authors who have best described these peoples distinguish the Scythians proper or *Scolotes,* as they called themselves, the immediate neighbors on the north of the ancient Greeks, from the Sarmates who lived to the east of these, and from the Saks who dwelt further east in the land now known as Turkestan.

The Scythians proper occupied from the time of Herodotus the region between Atlas (the present Aluta, tributary of the Danube) on the west and the Tanaïs (the Don or perhaps the Molotchnaïa) flowing into the Sea of Azov on the east. To the south their frontier was marked by the lower course of the Danube from the mouth of the Aluta, and by the Black Sea. To the north their territory extended to the country of the Agathyrces (Transylvania?), to the Neuri in the upper basin of the Dneister and the Bug, and to the Androphages. Altogether they occupy the eastern part of Wallachia, almost all Moldavia, Bessarabia, and the present Russian provinces of Kherson and southern Podolia, and the Crimea, except the mountainous southern portion of the latter, which remained in possession of the savage Tauri. Herodotus divides the Scythians into (1) cultivators, dwelling in the valleys of the Dniester and the Bug, adjoining the Neuri and in the lower valley of the Dnieper and the Panticapée (probably the present Ingouletz); (2) the nomads of the eastern Crimea and south of the mouth of the Dnieper; (3) the Royal Scythians in the eastern Crimea and between the Dnieper and the Tanaïs; (4) the Kallipydes between the Bug and the mouths of the Danube. The Scythians are mentioned for the first time in Hesiod, and many ethnologists are of opinion that their arrival in Europe was about the 15th century B.C. The principal trait of nomadic life—sustenance from asses' milk—is recorded in every ancient description of this people, who were, for the most part, nomads and warriors. Hippocrates gives a detailed description of their mode of life—in four-wheeled chariots, impervious to rain, wind and snow, and often divided into two or three compartments. These chariots were drawn by hornless cattle, the women and children remaining within them while the men accompanied them on horseback. They remained in the same place while there was forage sufficient for their animals, failing which they moved onward. They lived on cooked meats, asses' milk and cheese.

Excellent horsemen, the Scythians hunted and fought on horseback; they were famed as bowmen, but were poor swordsmen. Enemies slain in battle were scalped and their blood drunk from the skulls of others previously slain.

Their religion was a kind of polytheism without external worship. They had no temples nor images of deities to which prayers and sacrifices were offered. The god of war alone had special places reserved for his especial adoration. To him animals and even human beings were offered in sacrifice. Fire worship was general. Women enjoyed a certain amount of consideration due, it is thought, to the legend that the people were descended from a female-warrior race, the Amazons.

The mode of life of the nomadic Scythians led many to a belief in their Mongolian origin. This opinion is, however, no longer held. The little we know of their language, customs and religion leads rather to the conclusion that they were Iraneans. About the second century B.C. the Scythians were conquered by the Sarmates and absorbed by them. Thereafter they dis-

appear from history. Consult Deniker, 'Races of Man'; Ratzel, 'History of Mankind' (1900).

SEA. See Ocean.

SEA-ACORN, or **ACORN-BARNACLE.** See Barnacle.

SEA-ADDER. See Stickleback.

SEA-ANEMONE, a popular name, having reference to their flower-like aspect, for certain polyps or cœlenterate animals belonging to the suborder *Actinaria* of the order or class *Anthozoa.* The sea-anemones are sac-like animals of a more or less cylindrical form, usually fixed by a base or foot to some firm body, and with a disc at the opposite end in which is the slit-like mouth surrounded by whorls of simple hollow tentacles in greater or less number, but nearly always some multiple of six. From the mouth a short tubular gullet or œsophagus reaches into the cavity of the body to the walls of which it is connected by radiating septa or mesenteries, which divide the body-cavity into a corresponding number of sacs, with all of which the œsophagus communicates by a central space into which the septa do not reach. A pair of ciliated grooves or siphonoglyphs extend along opposite sides of the œsophagus and into the corresponding corners of the mouth. These always remain open and are the seat of inflowing and outflowing currents of water, serving a respiratory function as well as for the transportation of waste matter from the body. The body-walls, as well as the tentacles, which are outgrowths from them, are very contractile and largely composed of muscles arranged in a circular and a longitudinal layer, the former serving for purposes of extension, the latter for retraction. These muscles have special relations to the mesenteries. The mesenteries are vertical radiating septa reaching from the mouth disc or peristome to the base, and from the body wall to the œsophagus, but below the level of the latter ending freely. They are not strictly radial in arrangement but are grouped in pairs almost always, like the tentacles, in some multiple of six. The mesenteries corresponding to the siphonoglyphs differ in structure from all of the others and are termed directive; the others form different classes according to the order and degree of development. The inter-mesenteric sacs may further communicate by one or two pores in each mesentery. Along the edges of the septa the testes and ovaries are developed from the cells lining the gastric cavity. Digestive cells are also found in the same region as well as an area filled with stinging thread cells or nematocysts. In some species the latter are found in addition upon delicate threads or acontia which may be protruded through the mouth or cinclides.

Most of the anemones live singly, but some are colonial, in which case they never, like the closely related stone corals, form an internal limy skeleton, but may form a superficial one in the ectoderm. Generally they live attached to rocks or piles, but a few burrow in mud or sand, some as commensals fix themselves to shells inhabited by hermit crabs, etc., and a few are truly parasitic in jellyfishes. All are marine; most sublittoral, some deep-sea and a very few pelagic. They reproduce both asexually by budding and fission and sexually by eggs and spermatozoa, which are usually produced by different individuals. The eggs are fertilized in the gastric cavity and escape from the mouth in most cases as minute free-swimming larvæ or planulæ which soon attach themselves, develop mouth, tentacles and mesenteries, the latter in a definite order, until the adult structure is attained. Sea-anemones are carnivorous, but, having very limited powers of locomotion, are dependent upon such food as falls upon the expanded tentacles and peristome. This is captured through the paralyzing effect of the stinging cells or engulfed by the enfolding tentacles and passed through the mouth into the gastric cavity for digestion, the undigested portion being rejected through the mouth. They will devour a surprising quantity of food and grow rapidly; and if starved, gradually shrink to almost the point of disappearance without losing their form. The species are quite numerous and are chiefly distinguished by the arrangement of the septa and tentacles, with color, form, etc., as minor characteristics. Most of them and particularly the tropical forms are beautifully colored. A large, handsome and variable species very common on the rocky shores of New England is *Metridium marginatum,* which makes an interesting inmate of the marine aquarium. Consult Agassiz, E. C., and A., 'Seaside Studies in Natural History' (Boston 1871); Arnold, A. F., 'The Sea Beach at Ebb Tide' (New York 1900); Mayer, A. G., 'Sea-Shore Life' (ib. 1905); Lankester, 'Treatise on Zoology,' Pt. II (London 1901); for American species, Parker, 'American Naturalist' (1900).

SEA-BASS, a fish (*Centropristis striatus*) of the family *Serranidæ* (q.v.), also known as the black-fish, etc. It commonly attains the length of about a foot and a weight of two to four pounds, and is readily known by the large mouth with the teeth of moderate and nearly uniform size, the smooth area on top of the head, the rather large very rough ctenoid scales, continuous dorsal fin with a very strong spine and the slightly trilobate tail with a short filamentous tip to the upper angle. The color is mottled blackish with more or less evident parallel pale streaks. The sea-bass is well known along the entire Atlantic Coast of the United States and is very common from Cape Cod to the mouth of Chesapeake Bay. It lives on rocky ledges wherever an abundance of food offers itself, and feeds voraciously upon all sorts of small crustaceans, fishes, squids and other mollusks, etc. The sea-bass is a sluggish bottom-loving fish, but appears to be somewhat migratory. It spawns in June and the eggs are of small size and buoyant. During the summer large numbers of the young collect in the shallow bays, where eel-grass grows in abundance. Owing to its abundance and the readiness and determination with which it takes the hook this is deservedly a favorite with anglers who lack the opportunity or skill to cope with nobler game. The fishing is done with hand-lines in from 5 to 20 fathoms of water, a heavy lead and a stout hook, preferably baited with squid, being required. Where they are plentiful two fish are frequently brought up simultaneously on as many hooks and large strings are taken during a single slack water, which is the time best suited to their capture. For the market large

numbers of sea-bass are taken by lines and in pound nets on the coasts of New Jersey and Massachusetts. The firmness, whiteness and sweetness of its flesh makes this a table favorite, especially for chowder. The sea-bass is readily propagated artificially, but there has been no necessity for entering upon this work on a large scale. The name is also sometimes applied to various other more or less closely related species.

SEA-BEANS, very hard-shelled seeds of tropical plants carried by ocean currents and deposited on beaches, where they take root. Those washed up on the Florida sands take a high polish and are made into jewelry and souvenirs. The polished, marble-like, pale-gray seeds are those of a tall Central American shrub (*Cæsalpinia bonducella*), known in their native country as the nicker or bondue nuts. They are employed for necklaces and by Indian doctors as a tonic and vermifuge. Other common sea-beans are flattened, like lima beans, with a pitted or granular surface, and are of various sizes and hues, ranging through shades of red and brown to black or mottled. These are the fruits of species of *Mucuna* and *Stizolohium,* the former climbing shrubs, the latter annual herbs, widely dispersed through the tropics and very annoying to travelers, as the seed-pods are covered with stinging hairs, easily detached. The Queensland nut, the Kindal-Kindal of Australia, is a nutritious nut, the fruit of a small Australian tree (*Macadamia ternifolia*) and so valuable as a food that no one is allowed to fell the trees. The seed is about the size of a hazelnut, with somewhat the same flavor. It is squarish, jet black, with a polished surface of iron-like hardness. A woody climber (*Entada scandeus*), native to Australia, the West Indies and other tropical countries bears pods two to four feet long and several inches wide. Its seeds, known as liner-beans, from their color, are used for washing the hair and for laundering and the shells are made into receptacles for trinkets.

SEA-BEAR. See Seals and Sealing.

SEA-BLITE. See Goosefoot.

SEA BOUNDARIES. See Boundaries of the United States.

SEA-BREAMS, fishes of the marine family *Sparidæ,* represented in the United States by the sheepshead and its congeners. They are coast-fishes of modern size, distributed throughout the warm and temperate parts of the world and are usually of dark coloration. They are distinguished by the strength and elaboration of their teeth, fitting them for seizing and chewing crustaceans, mussels and shellfish of all sorts. The fish most famous under this name is probably that of the Mediterranean *Chrysophrys aurata,* called gilthead in England, which sometimes reaches a weight of 20 pounds, and was one of the kinds fattened by the Romans of the classic age in fish ponds and regarded as especial delicacies.

SEA BUCKTHORN, or **SALLOW-THORN,** a monotypic genus (*Hippophaë*) of the *Elæagnaceæ,* confined to temperate Europe and the steppes of central Asia, and living near sea-coasts and alpine rivers. The single species, *H. rhamnoides,* is a thorny shrub, sometimes cultivated, especially for hedges near the sea in sandy soil, where it grows luxuriantly. The leaves are linear lanceolate, silvery in color; the inconspicuous diœcious flowers on the female plants are followed by succulent orange-colored, agreeably acid fruits. When the fruit is ripe in the fall the female plants are very beautiful because the berries are very abundant. These are used for making fish-sauces, jellies and condiments.

SEA-COCOANUT. See Palms.

SEA-COOT, a gunners' name for certain dark-colored ducks, especially the American scoter.

SEA-COW, a name often applied generally to sirenians (see Sirenia; Manatee), but especially restricted to the species formerly inhabiting the Pacific Coast of Kamchatka,—Steller's sea-cow (*Rhytina stelleri*), now extinct. Structurally it differs from other sirenians in the total absence of teeth, the masticating surfaces of the jaws being merely horny pads, very dense and hard. The tail was lobed and the fore limbs small truncate paddles. This was a very large animal, attaining a length of 25 feet and being very bulky. It is now entirely extinct and was under the observation of white men for a bare quarter of a century. In 1741 the explorer Bering and the naturalist Steller discovered this great animal about the shores of two small islands, now known as Bering and Copper islands, in the extreme north Pacific Ocean. It is not known to have lived elsewhere and there is no proof that any examples have been seen since that killed in 1768. Steller has preserved an account of their habits and anatomy during the period when he was a shipwrecked resident of that inhospitable region. The animals were at that time very abundant in the shallow waters about the islands, where they fed upon the large seaweeds which grow there so plentifully. They were extremely sluggish and inactive and of an unsuspicious, affectionate disposition. Upon Steller's return to Germany his discovery and suggestion that the flesh of these great seacows be utilized by explorers were published. Russian traders and trappers visited the islands in large numbers and in the short space of time noted exterminated this interesting animal. Consult Nordenskiöld, N. A. E., 'Voyage of the Vega' (English trans. by Alexander Leslie, 2 vols., New York 1881), and Stejneger, L. H., in the *American Naturalist* (Vol. XXI, Salem, Mass., 1887).

SEA-CUCUMBER, a holothuria (q.v.).

SEA-DEVIL, a devil-fish (q.v.).

SEA-DOVE, the little auk. See Dovekie.

SEA-EAGLE, an eagle of the genus *Haliaëtus,* especially the white-tailed eagle or Erne (*H. albicilla*) of Europe. See Eagle.

SEA-EGG. See Egg-urchin; Sea-urchin.

SEA-ELEPHANT. See Elephant-seal.

SEA-FAN. See Gorgonia.

SEA-FIR, a sertularian. See Cœlenterata.

SEA-FOX, a shark. See Thresher.

SEA-GULL, The (Chalka), a tragedy of Chekhof, first performed in Saint Petersburg in 1896, when the author was 31. It failed, but later met with brilliant success at the Moscow Theatre, and has perhaps been the most popu-

lar of Russian plays on the English stage. It was translated into English by Marian Fell (Mrs. Van Agnew) and published in New York in 1912. A hint at the plot may be given by a sort of algebraic formula: A, a famous actress, is the mistress of B, a famous novelist, who comes with A to visit her brother C, a typical landowner and invalid. A's son, D, who has ambitions as a playwright is in love with E, the beautiful daughter of a wealthy landowner. E, being unhappy at home, has a great desire to go on the stage, and easily falls a victim to B, who seduces her and deserts her, after their child is born. E comes back secretly after two years and has a passionate interview with D, confessing that she still loves B. She disappears, and D shoots himself. On C's estate is a beautiful lake which is the haunt of gulls. D kills one of them and has it stuffed. This «chalka» is typical of the heroine, E. B to E once said: «A young girl grows up on the shores of a lake, as you have. She loves the lake as the gulls do, and is as happy and free as they. But a man sees her who chances to come that way, and he destroys her out of idleness, as this gull here has been destroyed.»

There are passages of wit and humor in the play, but it is chiefly notable for its revelation of the darker strains of human nature, depicted with relentless realism and yet with a passionate sympathy with all suffering, physical, mental and moral. It is also interesting here and there, especially in contrasting the literary methods and aspirations of B and D, giving a hint at Chekhof's own literary creed. And E, the lovely young heroine, shows her whole attitude, in advance of the tragedy which, while it ruins D, only gives the cachet to her own ability as an actress, when she exclaims to her seducer: «For the joy of being an author or an actress I could endure want and disillusionment and the hatred of my friends and the pangs of my own dissatisfaction with myself; but in return I should demand fame — genuine, resounding fame.»

NATHAN HASKELL DOLE.

SEA-HARES, a genus (*Aplysia*), of opistho-branchiate gastropod mollusks, in which the shell is either absent or very rudimentary, and is concealed by the mantle. These animals are slug-like in appearance and derive their popular name from the prominent character of the front pair of tentacles which somewhat resemble the ears of a hare. The side lobes of the mantle are used as fins, and are reflected over the sides and back of the sea-hares, these portions of the mantle thus concealing the shell. This latter structure, when developed, is of oblong, flexible and transparent character. The gills are placed in the centre, and at the posterior portion of the dorsal surface or back; and four tentacles exist. Eyes are present, and are situated at the base of the hinder tentacles.

The sea-hares are widely distributed throughout most seas, and generally inhabit muddy or sandy tracts. The eggs are deposited in long strings. The food consists chiefly of sea-weeds, but they also devour small crustaceans, mollusks and annelids. The mouth possesses thick muscular lips, and the stomach is of compound nature, consisting of a crop, muscular gizzard and accessory cavities. The sea-hares were notorious among the ancients for their supposed venomous properties, and formed ingredients in the poisonous compounds used of old to destroy enemies. Locusta is thus said to have used them against the enemies of Nero; and they formed ingredients in the draught prepared for the tyrant himself. Domitian was similarly suspected of administering the poisonous Aplysiadæ to his brother, Titus. And when Apuleius was accused of practising magic a chief proof against him was the fact that he had employed fishermen to obtain sea-hares for him. These animals, however, are harmless so far as poisonous properties are concerned, except that some species exude an acrid liquor irritating to the human skin. The «lernæa» (*Aplysia leporina*) of the Bay of Naples has an evil reputation among fishermen for causing pain and sickness when touched. The sea-hares also emit a fluid of a rich purple hue, which, like the ink of the cuttle-fishes, has the property of diffusing itself quickly throughout the surrounding water. Gosse mentions that a West Indian species of Aplysia, on being put into a basin of clear sea-water, emitted sufficient of this purple secretion to tinge deeply the whole of the water within a few minutes. Consult 'Cambridge Natural History' (Vol. III, New York 1895); Lankester, 'Treatise on Zoology' (Vol. V, London 1906); Parker and Haswell, 'Text-book of Zoology' (Vol. I, New York 1910).

SEA-HORSE, a small fish of the genus *Hippocampus,* in which the head bears a close resemblance to that of the knight in chess. They belong to the order *Lophobranchii* and the same family (*Syngnathidæ*) as the pipe-fishes. From the latter, and indeed from all other fishes, they differ in having a prehensile tail, which is long, tapering and quadrate in section, owing to the integument of angulated, bony plates, and lacks altogether the caudal fin. The body is compressed, curiously prominent below, protected by rings of spinous bony plates, and bears small pectoral, dorsal and anal fins. In addition to its form the head is remarkable in being supported at right angles to the body-axis on a neck-like construction. Like other parts it is protected by tuberculated or spiny bony plates. A prolonged snout bears the small toothless mouth at its end. The gills are tufted and their arches and covers poorly developed. About half a dozen closely similar species are found in our waters, the best known of which is *H. hudsonicus* found in shallow bays and estuaries along the Atlantic Coast as far north as Cape Cod. There is no more interesting inmate of the marine aquarium than the sea-horse, which twists its tail about the stems of sea-plants, among which it seeks concealment or swims slowly in a very unfishlike attitude, with coiled tail, upright in the water. As in the pipe-fishes the eggs are protected until hatched in a brood-pouch at the base of the tail of the male. Other species occur in the warm waters of the Gulf of Mexico and California. A remarkable related genus is *Phylloperyx* of Australian seas, which bears numerous long cutaneous streamers closely mimicking the seaweeds among which the animal dwells.

In symbolic and heraldic art a «sea-horse» appears as a fabulous marine animal with foreparts like those of a horse, and with hinder

parts like a fish. Neptune is depicted as using them to draw his chariot. In the sea-horse of heraldry a scalloped fin runs down the back. In Biblical literature and early books generally the term often refers uncertainly to the walrus or to the hippopotamus. Consult Gunther, Albert, 'Introduction to the Study of Fishes' (London 1880), and Jordan, D. S., 'Fishes' (New York 1907).

SEA ISLAND COTTON. See COTTON CULTIVATION IN THE UNITED STATES.

SEA ISLANDS, the islands off the coast of South Carolina, south of Winyah Bay. They are a chain of low, flat islands noted for their fertility. The principal islands are Hilton Head, Port Royal, Saint Helena, Edisto, Johns and James. The quality of the long fibred "Sea Island cotton" is famous, and the rice product is large. In 1893 and in 1894 hurricanes devastated several of the islands, inundating them with the tidal waves and destroying the crops.

SEA-KALE, a cruciferous, large-leaved perennial (*Crambe maritima*) indigenous to the coasts of Europe. It has glaucous cabbage-like foliage and clusters of showy white flowers and is cultivated in rich soil for the young shoots and unfolded leaves, which are blanched and eaten as spring vegetables, like asparagus.

SEA-LAMPREY. See LAMPREY.

SEA LAVENDER, SEA PINK, THRIFT, a name common to various species of *Statice* (q.v.), and to the closely allied species of *Limonium.* Several of the former, being hardy, are popularly cultivated as border plants. They include annuals, biennials and perennials with abundant small blue, lilac, yellow or white flowers which are often used for "everlasting" bouquets. Species of *Limonium* are mostly perennial, are useful for cut flowers and for planting among rocks.

SEA-LEMON, a shell-less mollusk of the nudibranch family *Doridæ,* of cosmopolitan range. The body somewhat resembles a lemon in color, showing a beautiful plume-like tuft of gills (when expanded) on the back. These mollusks are carnivorous, feeding on zoophytes, crustacea, etc., and live under stones on the beach, usually near low-water mark. The eggs are emitted embedded in broad gelatinous ribbon-like masses, which may be found attached to the fronds of sea-weeds. These "spawn-coils," as they are named, include immense numbers of eggs. Darwin estimated that upward of 600,000 ova were contained in a coil found at the Falkland Islands.

SEA-LETTUCE, the delicate, thin, waving fronds of *Ulva lactuca,* a pale green sea-weed often used for food.

SEA-LILY, a crinoid (q.v.), especially a living example, as *Pentacrinus;* fossil crinoids are often called stone-lilies.

SEA-LION. See SEALS AND SEALING.

SEA-MAT, or **HORN-WRACK,** a colony of polyzoans (see POLYZOA); specifically, on British shores. Some species of *Flustra,* as the broad horn-wrath (*F. foliacea*).

SEA-MINK, one of the names of the king-fish (*Menticrrhus americanus*). See KING-FISH.

SEA-MOUSE, a free-moving marine annelid of the genus *Aphroditæ,* the most highly organized of "the world of worms." The body is oval, the head is provided with tentacles and two eyes and the back is covered with scales, which, by their expansion and contraction, provide for the admission and expulsion of water from the gills or branchiæ, situated beneath them. The most notable feature of these animals, however, is the beautiful iridescent hues exhibited by the hairs, which, as in other *Errantia,* fringe the sides of the body. The setæ of *Aphroditæ,* even preserved in spirits of wine, still give up these brilliant hues. These animals inhabit deep water and may be obtained by dredging, although they are frequently cast up on shores after storms. Various genera and species exist, some of which are North American. Consult Verill, 'Zoology of Vineyard Sound' (1875).

SEA-ONION, a squills. See SCILLA.

SEA-OTTER, a fur-bearing animal (*Enhydris* or *Latax lutris*) of the weasel family (*Mustelidæ*), and in its webbed hind feet and aquatic habits resembling the true otter, with which it is united zoologically in the subfamily *Lutrinæ.* The sea-otter is of a robust build, about four feet long, with a short blunt tail, short limbs, small fore feet and large, fully-webbed hind feet. The ears are small and the broad muzzle bears spreading tufts of stout bristles. There are but two incisor teeth on each side of the lower jaw and the molar and premolar teeth are remarkable for their massiveness and the bluntness of the cusps. The inner fur, which is very soft, dense and woolly, is deep brown or, in old animals, black, the longer white-tipped hairs being scanty on the body, to which they impart a hoary aspect, but more abundant on the yellowish or grayish head and neck. Sea-otters were formerly very abundant on rocky shores and islands of the north Pacific on both the American and Asiatic sides. The natives of the Aleutian Islands clothed themselves in their skins, but with the increased demand for the fur in China, Europe and America, and especially among the Russian nobility, their unremitting pursuit by native and white hunters has rendered them one of the rarest and most valued of fur-bearing animals. In greatly reduced numbers they are still found in Alaska and within the United States on a very limited reach of the Oregon coast. The otters are now found especially on the island-like masses of the giant bladder kelp or sea-weed and much persecution has made them exceedingly shy and wary. They are strictly marine and never leave the vicinity of water. Their food consists of various kinds of crustacea, mollusks and sea-urchins, which are easily crushed between the blunt massive teeth which are not at all adapted to a fish diet. A single young is born at a time and at any season, and is nursed by the mother as she lies on her back in the water. A century ago a single trading company secured as many as 15,000 skins, valued at $1,000,000, in one year, but now the annual production of all the hunters would not exceed 5,000, and single skins are worth $150 to the hunter and $1,000 or more at the final market. Formerly they were taken in nets, or shot, speared and clubbed; but now are usually shot with rifles either by the natives from boats or while patroling the beach, or from observation tripods erected by white hunters

on the shores. The Alaskan fishery is now regulated by law. Consult Elliot, H. W., 'Report on Alaska' (Washington 1875); Coues, E., 'Fur-bearing Animals' (Washington 1877); Taylor, W. P., 'Osteology and Evolution of the Sea-Otter' (in 'University of California Publications,' Vol. VII, No. 25, Berkeley 1914).

SEA-PEN, an alcyonarian coral of the family *Pennatulidæ* (class *Actinozoa*). It is a compound organism, which consists of a main stem with lateral pinnæ or branches, forming a feather-shaped community. The lower end of the stem is fleshy, destitute of polyps and contains an internal coral-rod, by which the sea-pens attach themselves loosely to the mud of the sea-bed. In color they are reddish-purple, the lower extremity being of a bright orange hue. The branches are studded on their upper margins with the individual polyp, which are connected together through the fleshy medium or cœnosarc. These organisms are common in all the warm seas. The Arctic species, *Umbellularia grœnlandica,* attains sometimes the extreme length of four feet.

SEA PLANES. See Aeronautics.

SEA-RAVEN, a large and very spiny and irregular sculpin (*Hemitripterus americanus*), common about rocky shores and reefs from the Arctic to Cape Cod. See Sculpin; Sea-robin.

SEA-ROBIN, a popular name for certain of the gurnards (*Triglidæ*) in allusion to their generally reddish color and large wing-like pectoral fins. They have rather large heads, encased in bony plates and with flattened snouts and elongated tapering bodies covered with small scales. The pectoral fins are very large and spreading and are especially remarkable in having the three lowermost rays separated from the fin-web and free from one another; they are somewhat enlarged, provided at the end with special organs of touch and are used much like so many fingers to feel the bottom, turn over stones and other small objects and to detect the presence of food. Numerous species of the genus *Prionotus* inhabit American seas, especially southward, the best known of which are the short-winged sea-robin (*P. carolinensis*), with the pectoral fins red and less than half as long as the body and the long-winged sea-robin (*P. strigatus*) with the pectorals brown and more than half as long as the body. Both are common as far north as Cape Cod and the former in Massachusetts Bay also. The sea-robins are extremely interesting to watch, as they turn over small objects on the bottom with their tactile rays in search of the small fishes and crustaceans upon which they feed. Large numbers are caught upon lines and in nets, but though the flesh is white and very excellent, they are not considered to be a food-fish. Several related species are found on the Pacific Coast, and elsewhere, and some are called flying-fish. See Sculpin.

SEA-SERPENT, a more or less mythical sea-monster of serpentine form and reputed gigantic size, whose appearance has been reported at varying intervals and in many seas from the earliest times. The existence of a definite species of serpent of this sort is firmly believed in by most sea-faring men, many of whom have observed conformatory appearances. In a large number of instances these have been quite satisfactorily explained as tide-rows of sea-weed, etc., moved in an undulating fashion by wave action; as schools of porpoises moving in a single file, as giant squids swimming at the surface with their serpentine arms trailing behind, or in a variety of similar ways. There remain, however, a number of accounts whose circumstantiality and general agreement, together with the trustworthiness of the narrators, are such that many zoologists are convinced of the existence of such a monster and few are willing to deny it, although, in the absence of direct proof, a scientific skepticism prevails. That large fishes of serpentine form live in the open ocean is well known and these may prove to be the foundation of many of the sea-serpent stories. Among these are the ribbon-fishes (*Regaleidæ*) of which a number of species have been described. They have elongated, compressed, tapering bodies with oblong heads and toothless jaws and a continuous dorsal fin for the entire length, rising on the head into a prominent crest. Specimens of these fishes exceeding 20 feet in length have been actually washed ashore and examined by naturalists, and others of much larger size have been observed swimming swiftly at the surface, presenting a veritable sea-serpent aspect. One has been taken in the Bermudas, another on the coast of California and perhaps a score on other shores, while many more have been seen alive. The ribbon-fish is supposed to live in the depths of the sea and to come to the surface only occasionally. A slender eel-like shark (*Clamydoselache*) also lives in the deep waters of the Pacific, and if it attains a large size might justify reports of sea-serpents seen in that region. In past ages huge serpent-like creatures did actually roam the high seas, and some naturalists have considered the possibility of some of these persisting in the oceanic abysses down to the present times. The most important of these were the mosasaurs (*Pythonomorpha*), rather closely related to true serpents. During the Cretaceous period they were widely distributed and some reached a length of 60 or 70 feet and were extremely elongated and slender, with pointed heads and two pairs of paddle-like limbs.

The only true marine serpents of the present day are the sea-snakes (*Hydrophidæ*), which live in warm seas of most parts of the world, often far from land. All are of small size, with compressed tails, and are very venomous. They feed on fish, are viviparous and produce their young among the rocky shores of islands, etc.

Consult Goode and Bean, 'Oceanic Ichthyology' (Washington 1875); Gunther, 'Challenger Reports' (Vol. XXII, London 1887); Boulenger, 'Natural Science' (1892); Lee, 'Sea Monsters Unmasked' (London 1883); Oudemans, A. C., 'The Great Sea Serpent: An Historical and Critical Treatise' (London 1893); Wilson, A., 'Leisure-Time Studies' (ib. 1878).

SEA-SIDE GRAPE, a small tree (*Coccoloba uvifera*) of the family *Polygonaceæ*, which grows on the sea-coasts of Florida and the West Indies. It has clusters of edible fruit somewhat resembling currants, and a beautiful hard, violet-colored wood, which produces a red dye and a juice known as West Indian kino, that is nearly as valuable as the officinal kino.

SEA-SLUG, a nudibranchiate mollusk. See NUDIBRANCHIATA.

SEA-SNAKE, a venomous, marine East Indian serpent of the numerous family *Hydrophidæ*. See SEA-SERPENT.

SEA-SPIDER, a spider-like «no-body crab» of the class *Pantopoda;* also, a spider-crab (q.v.).

SEA-SQUIRT, an ascidian or tunicate (qq.v.), so named from the habit of emitting jets of water from the orifices of the body when touched or irritated in any way. Other less apt names found in British books are sea-pear, sea-pork, etc.

SEA-SWALLOW. See TERN.

SEA-TROUT, a popular name for various fishes, primarily for the common salmon-trout (*S. trutta*) of British waters. In other parts of the world various fishes more or less resembling it are called sea-trout, as the weakfish (q.v.) in the southern United States.

SEA-URCHIN, an echinoderm of the class *Echinoidea* (q.v.), members of which differ from crinoids or starfishes in their compact spheroid, discoid or heart-shaped forms without arms or a stalk. The numerous species differ greatly in the number and arrangement of the calcareous plates forming the continuous test and in the character of the spines and other appendages with which the latter is studded. Of both fossil and living forms about 250 genera and 4,000 species are known. Although representatives of the 400 or so living species occur in most seas they are more numerous in warm waters, the West Indian fauna being the richest in the world. Regular sea-urchins are distributed widely in the littoral zone, but the irregular ones are especially characteristic of deep waters and the southern oceans, some of them extending to the utmost abysses. The shallow-water forms being subjected to the constant beating of the surf along the rocky shores which they chiefly inhabit are provided with a highly developed system of suctorial ambulacral feet, by means of which they are enabled to retain a hold. Many species also possess the remarkable power of boring into solid rock in which they excavate chambers exactly fitting them and increasing in size with their growth. Frequently the orifice representing the earlier dimensions of the chamber is too small to permit the urchin's escape and the animal is at once imprisoned in its cave and protected from any possibility of injury by the beating waves. The long-spined *Diadema* thus completely honeycombs the surface of the coral rock of the Bahama Islands, etc. Although this power of excavation is most displayed on soft calcareous rocks, the fact that solid granite is similarly bored in some parts of the world shows that it is not the result of a solvent action, but of a slow wearing away of the rock by the jaws and constant movements of the spines. Sea-urchins of most species swallow rock débris and sand in large quantities, digesting the abundant minute animal and plant life which it contains. Most of the species are gregarious, vast numbers collecting in certain areas on the sea-floor until their bodies completely pave the bottom. During the reproductive season, usually the summer, the ovaries and testes, found in separate individuals, become so greatly enlarged that they fill almost the entire interior of the test. Such forms are called sea-eggs, and this name is sometimes applied to regular sea-urchins generally. In some countries they are baked and eaten while in this condition. The egg-urchin (*Hipponoë esculenta*) of the West Indies is a large species so utilized. But very few species of sea-urchins are found in the shallow waters of the Atlantic Coast of the United States. The green sea-urchin (*Strongylocentratus drobachiensis*) is very common on the rocky shores of New England and the Pacific States. Besides the diatoms, etc., which it digests from the sand that it swallows, it also devours dead animals of every kind. Another example of the regular urchins is the purple or deep brown *Arbacia punctulata,* which is provided with very stout spines and is found from Cape Cod to the Gulf of Mexico. The species of *Diadema* and *Toxopneustes* occur only in the South Atlantic States. Of the flat or cake urchins (*Clypeasteroidea*) the sand dollars (*Echinarachinus parma* and *Mellita testudinata*) are examples. Both live in great numbers buried in the sand or lying on its surface on shoals, the first being most plentiful northward, the last southward. The heart urchin (*Moira atropos*) is the only example of the *Spatangoidea* that reaches even as far north as North Carolina in shallow water. Many interesting species of this and the other groups have been dredged in the deep water along the continental slopes and elsewhere. See ECHINODERMATA; ECHINOIDEA.

Consult Agassiz, 'Revision of the Echini' and subsequent articles in the Memoirs of the Museum of Comparative Zoology (Cambridge 1872); Agassiz, 'Seaside Studies' (Boston 1871); Lang, 'Lehrbuch der vergleichenden Anatomie' (Jena 1894).

SEA-WHIP. See GORGONIA.

SEABOARD AIR LINE RAILWAY COMPANY, the corporate name of a transportation system of southeastern United States. Its main arteries extend from Norfolk and Richmond, Va., southward to Tampa and Miami, Fla., and southwestward to Bessemer and Montgomery, Ala. Under a consolidation agreement of 11 Oct. 1915 the Seaboard Air Line Railway was consolidated on 16 Nov. 1915 under the laws of Virginia, North Carolina and South Carolina with the Carolina, Atlantic and Western Railway under the corporate name of the Seaboard Air Line Railway Company. The Carolina, Atlantic and Western Railway was a consolidation (April 1914) of the North and South Carolina Railway, the Charleston Northern Railway, the South Carolina Western Railway and the South Carolina Western Extension Railway, and had a total mileage owned of 330 miles and 86 miles under construction. Its lines extended from Hamlet, N. C., via Andrews, S. C., to Charleston, S. C., also from Lanes, via Andrews, to the port of Georgetown, S. C., also from McBee, S. C., through Hartsville, Darlington and Florence to a connection with the first-mentioned line at Poston, S. C., with branches to Sumter and Timmonsville. The 86 miles under construction were from Charleston to Savannah, which was opened to freight operation on 15 Oct. 1917 and to passenger operation on 5 Nov. 1917. The former Seaboard Air Line Railway was incorporated

April 10, 1900 in Virginia as successor to the Richmond, Petersburg and Carolina Railroad, a 102-mile road between Richmond, Va., and Norlina, N. C. The Georgia and Alabama Railway was acquired by purchase Feb. 20, 1902; other roads were absorbed in November 1901, and the Florida Central and Peninsular Railroad on June 27, 1903, the system comprising lines extending from Richmond, Va., to Atlanta, Ga., and Jacksonville and Tampa, Fla., with numerous branches, embracing in all over 3,120 miles of road. In November 1909 the Atlanta and Birmingham Air Line Railway, 237 miles; the Florida West Shore Railway, 19 miles, and the Tallahassee, Perry and Southeastern Railway, 39 miles, were merged in the Seaboard Air Line Railway. Its total mileage at present is 4,490.38 miles. The property of the Atlantic, Suwanee River and Gulf Railroad Company, the mileage of which had previously been included in that of the Seaboard Air Line, was transferred during the fiscal year 1909–1910. In 1911–1912 the Seaboard Line absorbed the properties of the Seaboard and Roanoke Railroad and the Roanoke and Tar River Railroad. The Georgia and Alabama Terminal Company is practically merged with the Seaboard, although its corporate existence is maintained. In April 1917 the Seaboard Company took over control of the Tampa and Gulf Coast Railroad and the East and West Coast Railway, and in 1926 it acquired the entire capital stock of the Tavares and Gulf Railway. Through the Seaboard-All Florida Railway, organized in 1925 to lease the Florida Western and Northern Railway Co., and the East and West Coast Railway, the company extended its lines to Miami, Florida, and built new lines, totaling 194 miles, on both coasts of the State. In July 1927 it acquired the entire capital stock of the Jacksonville, Gainesville & Gulf Railway; in Jan. 1928 the common stock of the Georgia, Florida & Alabama Railroad Company; and on Mar. 1, 1928 it acquired the entire capital stock of the Charlotte Harbor & Northern Railroad Company. It owns the entire capital stock of the Baltimore Steam Packet Company, and has an interest in the Macon, Dublin & Savannah Railroad. On Dec. 23, 1930 it was again placed in receivership. Operating revenues in 1929 amounted to $58,151,908, and in 1939 to $44,163,420. It maintains through car service between New York, Philadelphia, Washington, and the South.

SEABORG, Glenn Theodore, American nuclear physicist: b. Ishpeming, Mich., April 19, 1912. A graduate of the University of California (A.B. 1934, Ph.D. 1937), he remained at the university as research associate in the chemistry department. Promoted instructor (1939), then assistant professor (1941), he was appointed professor in 1945. During 1942–1946 he was on leave of absence working in the Metallurgical Laboratory of the University of Chicago. In 1940 he was codiscoverer of element 94 (plutonium), in 1941 of nuclear energy isotope Pu-239, and in 1944 of elements 95 (americium) and 96 (curium, qq.v.). In 1946 he became a member of the general advisory committee of the Atomic Energy Commission.

SEABURY, sē′bŭ-rĭ, **Samuel,** American Protestant Episcopal bishop: b. North Groton, Conn., Nov. 30, 1729; d. New London, Conn., Feb. 25, 1796. He was graduated at Yale College in 1748, and three years later took a course in medicine at the University of Edinburgh. He did not, however, practice this profession, but entered at once upon a course of theological study. He was ordained deacon and priest in the English Church in London in December 1753. Returning to America in the following summer, he became rector of Christ Church, New Brunswick, N. J. In 1757 he took charge of Grace Church, Jamaica, L. I., and in 1766 of Saint Peter's, Westchester, N. Y. In the autumn of 1775 he was obliged on account of his Loyalist sympathies to leave his parish and he resided, during the greater part of the war, in New York. He wrote numerous articles in support of the Tory cause, of which he was one of the ablest advocates, and suffered much, even to imprisonment and exile, for his loyalty to the king, though when peace was declared no one was more faithful to the United States. Immediately after the articles of peace were received in New York, 10 out of the 14 Episcopal clergymen in Connecticut assembled at Woodbury to consider action as to the organization of the Church under the changed civic conditions. On the first formal ballot, they elected Dr. Seabury as bishop. He then sailed for England, and waited in London more than a year for consecration by the English bishops. Owing to the connection between the Church of England and the state, various political reasons stood in the way, and he finally determined, in pursuance of his original instructions, to apply to the Scottish bishops, who were in a more independent position. On Nov. 14, 1784, Seabury was accordingly consecrated at Aberdeen by the bishop and coadjutor-bishop of that see and the bishop of Moray and Ross. He then returned to America and there, in addition to his episcopal duties, assumed the rectorship of Saint James' Church, New London, which he held until his death. His jurisdiction was recognized over Rhode Island as well as Connecticut and afterward over Massachusetts; but the validity of his consecration was denied by many, partly owing to the prejudice excited by his former political attitude. In 1789, however, it was expressly affirmed by the General Convention. Seabury exercised much influence on the final shape of the constitution and liturgy of his Church, especially (in accordance with his agreement with the Scottish bishops) by insisting on the restoration of the oblation of the elements and invocation of the Holy Ghost in the Eucharistic office. He was a man of pronounced views, but of great simplicity, humility and self-sacrifice; and the value of his services to the infant Church can scarcely be overestimated. Consult Beardsley, E. E., *Life and Correspondence of The Rt. Rev. Samuel Seabury* (1881); Tyler, M. C., *Literary History of the American Revolution* (1897).

See also Protestant Episcopal Church.

SEABURY, Samuel, American Protestant Episcopal clergyman, grandson of Bishop Samuel Seabury (q.v.): b. New London, Conn., June 9, 1801; d. New York, Oct. 10, 1872. He was privately educated but took his A.M. at Columbia College in 1823. He was ordained in 1828, was professor of languages at Flushing Institute and Saint Paul's College in 1828–1834 and in 1834–1849 he edited the *Churchman.* He was rector of the church of the Annuncia-

tion, New York, in 1838–1868, and from 1862 he was professor of Biblical learning at the General Theological Seminary, New York. Among his books are *The Continuity of the Church of England in the Sixteenth Century* (1853); *American Slavery Distinguished from the Slavery of English Theorists and Justified by Law of Nature* (1861); *Theory and Use of the Church Calendar* (1872).

SEABURY, Samuel, American lawyer and judge: b. New York, N. Y., Feb. 22, 1873. The son of the Rev. William Jones Seabury and a great great grandson of Samuel Seabury (qq.v.), first bishop of the Protestant Episcopal Church in America, he was educated by his father and in New York private day schools. The New York Law School conferred on him the LL.B. degree in 1893; he continued his studies during a postgraduate year and was admitted to the bar in 1894. Elected justice of the City Court of New York in 1901, he was in 1906 elected a justice of his state's Supreme Court for a 14-year term, but resigned in 1914 when elected associate justice of the Court of Appeals, New York State. He resigned his justiceship in August 1916 and the next month was nominated by the Democratic Party as its candidate for the governorship, but lost the election to Charles S. Whitman, re-elected governor for a second term. In 1930 he was appointed referee of the Appellate Division, 1st Judicial Department, New York, to investigate conditions in the magistrate courts, and the following year Gov. F. D. Roosevelt appointed him to hear charges filed against the district attorney of New York County. The same year he was counsel of the Joint Legislative Committee to investigate the affairs of New York City. His investigations revealed widespread corruption in the city government. Mayor James J. Walker, deeply involved, was forced to resign. Judge Seabury earned a national reputation as a foe of boss rule and champion of honest city administration.

SEABURY, William Jones, American Episcopal clergyman: b. New York, Jan. 25, 1837; d. Aug. 30, 1916. He was graduated at Columbia University in 1856 and received his master's degree there three years later. He took the degree of doctor of divinity at Hobart College in 1874, receiving the same degree from the General Theological Seminary in 1885. Meantime he studied law in the office of the late Stephen P. Nash, was admitted to the bar in 1858 and for a short time engaged in practice. Wm. Seabury succeeded his father in 1868 as rector of the Church of the Annunciation, where he remained until 1898. He was appointed to the chair of ecclesiastical polity and law in the General Theological Seminary in 1873 and occupied it until his death. During the latter part of his tenure he was the senior professor in the service.

SEACOAST ARTILLERY. See ARTILLERY.

SEAGER, Henry Rogers, American economist: b. Lansing, Mich., July 21, 1870; d. Kiev, Russia, Aug. 23, 1930. He was educated at the universities of Michigan, Pennsylvania, and Johns Hopkins, and then did further postgraduate work at Berlin, Halle, and Vienna. He was professor of political economy at the University of Pennsylvania in 1897–1902; was connected with the faculty of Columbia University from 1902, and from 1905 was professor of political economy there. In 1917 he was appointed secretary of the Shipbuilding Labor Adjustment Board at Washington, D.C. Author of *Introduction to Economics* (1904); *Economics Briefer Course* (1909); *Social Insurance* (1910); *Principles of Economics* (1917); *Practical Problems in Economics* (1923), etc.

SEAL, an engraved stamp bearing a device or inscription pertaining to the owner; also, the impression of such a stamp on a plastic substance, such as wax. A seal upon a document was originally a substitute for a signature; a seal upon a place of deposit was for security. Seals were used in pre-Christian times, and one of the earliest and commonest forms was the signet ring. In Egypt impressions of seals were made in fine clay, and attached to documents by slips of papyrus. The Romans used clay, beeswax and, in the time of the empire, lead for taking impressions. The Normans reintroduced beeswax in the Middle Ages; sealing wax was invented in the 17th century. Documents in England are still sealed as a formality, but the true voucher, to which alone any real importance attaches, is the signature.

There are three seals officially used in England by or in name of the sovereign—the great seal, the privy seal and the signet. In the United States, on July 4, 1776, Congress appointed Benjamin Franklin, John Adams and Thomas Jefferson a committee to prepare a device for the great seal of the United States. The committee reported various devices. William Barton, of Philadelphia, was appointed to submit designs. Sir John Prestwich, an English antiquarian, suggested a design to John Adams in 1779. Combining the various designs of Barton and Prestwich, a seal was adopted, June 20, 1782, as follows: Arms: Paleways of 13 pieces argent and gules; a chief azure; the escutcheon on the breast of the American eagle displayed proper, holding in his dexter talon an olive branch and in his sinister a bundle of 13 arrows, and in his beak a scroll with the motto: *E Pluribus Unum;* Crest: a glory breaking through a cloud proper and surrounding 13 stars; Reverse: A pyramid unfinished. In the zenith an eye in a triangle, surrounded with a glory proper, over the eye the words, *Annuit Caeptis.* Beneath the pyramid, MDCCLXXVI and words, *Novus Ordo Sacculorum.* The Confederate seal adopted by the Confederate Congress, April 30, 1863, was designed by Thomas J. Semmes, of Louisiana. The device represents an equestrian portrait of Washington, surrounded by the principal agricultural products of the Confederacy.

SEAL ISLANDS. See LOBOS.

SEAL OF THE CONFEDERACY. See GREAT SEAL OF THE CONFEDERACY.

SEAL OF THE UNITED STATES, Great. See GREAT SEAL OF THE UNITED STATES.

SEALING WAX, a resinous preparation used for securing folded papers and envelopes, and for receiving impressions of seals set to instruments. Ordinary red sealing wax is made

of pure bleached lac, to which when melted are added Venice turpentine and vermilion. Inferior qualities consist of common resin and red-lead, and black and other colors are produced by substituting appropriate pigments. Sealing wax was invented in the 17th century. Its use for sealing letters has been generally given up in favor of mucilage which, when moistened, fastens envelopes much more effectively and with greater rapidity than sealing wax.

SEALS AND SEALING. There are world-wide fisheries devoted primarily to the capture and utilization of fur seals and hair seals. Of less importance to these fisheries, but nevertheless objects of the hunt when sufficiently abundant, have been the sea lions, sea elephants, walruses and other marine mammals. The high value of the fur, leather, and oil products of this fishery in world commerce has brought many species perilously close to extinction while others, protected by international agreements and restrictive regulations, continue in abundance.

These animals all belong to the order *Pinnipedia* and are classified in three families: (1) *Otariidae,* the eared seals (fur seals), and sea lions; (2) *Phocidae,* the true seals or hair seals and sea elephants or elephant seals; and (3) *Odobenidae,* walruses. All are related to but differ from the carnivores in the finlike structure of the feet. Of the three families, the hair seals are the most highly specialized for aquatic life. The neck is short and the head can be raised only slightly; there are no external ears; and the posterior limbs are adapted for swimming to such an extent that these animals move with difficulty on land, whereas fur seals, sea lions and walruses can move with great rapidity in an undulating lope.

Fur Seals.—The fur seals of the world belong to two distinct groups or genera. One of these, the genus *Arctocephalus,* is widely distributed throughout the Southern Hemisphere where its members formerly existed in vast numbers along portions of the coasts of South America, South Africa, Australia, and New Zealand, as well as on many of the islands and land masses of the Antarctic regions. Only one species of this genus, the Guadalupe fur seal, occurs north of the equator. It was once abundant on the islands off the coast of southern and Lower California but only a few animals still remain. The second group of fur seals belong to the genus *Callorhinus* and are confined to the North Pacific; there are no fur seals in the North Atlantic.

By far the largest and most important herd of fur seals in the world is the Alaska herd which has its breeding grounds on the Pribilof Islands in Bering Sea. Here more than 80 per cent of all the fur seals in the world gather every year for four to six months, take up their only terrestrial life, give birth to their young, breed, and yield a part of their number to satisfy the couturiers of fine furs. Other herds of commercial importance resort to the Commander Islands off the Siberian coast, controlled by Russia; Robben Island and the Kuriles, formerly belonging to Japan, but now administered by Russia; Lobos Island belonging to Uruguay; and to the coastal area and adjacent islands in the vicinity of the Cape of Good Hope, South Africa. Remnants of once large herds are still to be found on many of the small islands in the South Atlantic, the Crozet Isles in the South Indian Ocean, and on Guadalupe and the Galapagos Islands in the Pacific. Tasmania, New Zealand, and Australia still have small colonies but these have been so reduced in size that the number of skins now obtained is insignificant.

Each herd is an independent, self-perpetuating unit, and the animals of the various herds do not intermingle. Permanent, constant anatomical differences between the animals of the several herds, both in the genus *Arctocephalus* and in the genus *Callorhinus,* have resulted in classification of their members as distinct and separate species. At least six species of the genus *Arctocephalus* and three of the genus *Callorhinus* have been described.

Southern Hemisphere.—Fur seals of the Southern Hemisphere were the first to feel the impact of commercial operations. Toward the end of the 18th century fur seal hunting began and grew rapidly in importance, and early in the 19th century it assumed gigantic proportions. Sealing first began at the Falkland Islands about 1784, and, according to the old accounts, "millions were taken during the next fifteen years." Fur seals were present in such numbers that there are records of "eight or nine hundred in a day" being killed with clubs on a single small islet. There are no fur seals on the Falkland Islands today and it is presumed they became extinct about 1800. Sealing voyages were made to the west coast of South Africa as early as 1790. The sealing fleet extended its range to include first the South Georgian rookeries, then successively those off the coast of Chile, Patagonia, Australia, the Antipodes, Crozet and Prince Edward Islands, the South Shetlands, Kerguelen Island, and others of lesser importance. There were approximately 60 vessels in the sealing fleet in 1801. The United States, Great Britain, Portugal, Germany, Russia, and France were represented in this enterprise. The fur seal skins obtained were taken mostly to the Canton market where, in exchange for teas and silks, they brought the comparatively low price of fifty cents to five dollars each. The sealing business was a profitable one, however, and this stimulated indiscriminate and exterminating slaughter. One after another of the populous seal rookeries was discovered and despoiled. Every seal that could be obtained was killed regardless of sex or age. So vigorously was sealing prosecuted that when the South Shetland rookeries were discovered in 1820 their immense wealth of seal life was nearly exterminated in a single season. There is a record of one vessel taking 57,000 fur seal skins in one season's operations. The period of prosperity was short-lived, and fur seals are now present in the Southern Hemisphere in significant numbers only on the South African coast and on Lobos Island near Maldonado, Uruguay, where they are protected and utilized on a management basis. Fur seals elsewhere south of the equator owe their existence to the inaccessibility of the rocky shores they inhabit, which offer partial protection against human predation.

Northern Hemisphere.—In the North Pacific, the Pribilof Islands were discovered by the Russian navigator, Gerassim Pribilof, in 1786, and the slaughter of the fur seals began there immediately, following the same destructive pattern pursued in the Southern Hemisphere. At the time of discovery, it was estimated that this herd contained at least 5,000,000 fur seals. In

the 50 years immediately following discovery about 2,000,000 fur seals were killed. By 1835 the Russian management had grown apprehensive as to the future of the herd and, in consequence, imposed restrictions on shore killings on the Pribilofs. Fortunately, these restrictions came soon enough and the herd responded to the more favorable conditions. In 1867, when these islands were acquired by the United States in the Alaska purchase, there were 3,000,000 fur seals in the herd.

During the first 40 years of ownership by the United States, the sealing privilege on the Pribilofs was leased to private companies, and more than 2,300,000 fur seal skins were taken, for which about $9,500,000 was paid into the United States Treasury. Such operations on shore were carefully regulated, but in 1879, and thereafter until stopped by the treaty of 1911, pelagic sealing, the killing of seals at sea, took a heavy and damaging toll and the herd suffered a serious decline. The Indians of the northwest coast from time immemorial followed the custom of spearing fur seals from their canoes as the herd passed along their shores from February to May. The number of animals so taken, primarily for food, was small and probably never exceeded a few thousand. In 1879 schooners engaged in this fishery, equipped to transport hunters and canoes to the sealing grounds and to care for them there. These schooners, averaging 70 tons, with sealing canoes and hunters on board, sailed chiefly from Victoria, B. C., but others based at Pacific Coast ports from San Diego to Seattle. Pelagic sealing commenced off the California coast late in December, and the migrating Pribilof herd was followed northward into Bering Sea where operations continued until September. A less important pelagic sealing industry was dependent upon the Japanese and Russian fur seal herds, the sealing grounds extending from the latitude of Yokohama to the Commander Islands in Bering Sea, and the season extending from March to September.

The rise of pelagic sealing was rapid. From one vessel in 1879, the sealing fleet had expanded to 122 vessels by 1891. The pelagic sealing fleet reached its zenith in 1894 when the ocean catch from the Pribilof herd totaled 143,000 animals. Thereafter the pelagic catch declined, and in 1902 was only about 15,000 seals.

Sealing on land could be controlled, for there the animals to be killed could be selected with respect to sex and age. At sea, however, all animals were targets for the guns of the pelagic sealers. The result was the loss of many injured animals, and many that were killed outright sank before they could be reached. In all cases, the killing of female seals at sea meant the destruction of unborn pups or of a pup left on shore to starve. The pelagic sealing catch, therefore, did not reflect accurately the drain on the herd.

Pelagic sealing was an extremely wasteful process but nothing could be done about it because it was carried on in waters beyond the control of the United States government. To be sure, an effort was made to prevent sealing in Bering Sea. Acting upon the precedent established by Russia in the ukase of 1821, the United States seized and confiscated a number of sealing vessels that entered Bering Sea. A lengthy controversy with Great Britain ensued, since the pelagic fleet was very largely of Canadian registry. In 1892 the entire matter was remanded to a tribunal of arbitration for settlement of the question of jurisdiction over fur seals in offshore waters, and also for recommendation of measures for the protection of fur seals. The tribunal of arbitration met in Paris in 1893 and denied the United States authority to exercise jurisdiction over Pribilof Islands' fur seals when such animals were more than three miles from shore. Regulations were formulated, the essential features of which were the establishment of a closed zone of 60 miles in Bering Sea about the islands, and a closed season from May 1 to August 1, within which all pelagic sealing was prohibited. These regulations were inadequate and the Pribilof herd continued to decline.

International Protection.—By 1911, this once great herd numbered only 125,000 animals. Extinction seemed certain. It was averted at the last possible moment, by the action of conservationists of the United States, Great Britain, Japan, and Russia, who finally succeeded in getting their countries to accept the terms of the fur seal treaty of 1911. Under the terms of this convention, the nationals of each of the treaty powers were prohibited from engaging in pelagic sealing in the waters of the North Pacific Ocean north of the 30th parallel of north latitude including the Seas of Bering, Kamchatka, Okhotsk, and Japan. Exception was made for aborigines in treaty waters using primitive methods. Management of fur seals on land was left to the country having jurisdiction over the rookery area, and provision was made for Japan and Canada to each receive 15 per cent of the land killings by the United States and Russia, and for the United States, Russia, and Canada to each receive 10 per cent of the land killings on Japanese seal islands. Great Britain had no shores frequented by fur seals within the protected area. This convention, as drawn, was to remain in effect for 15 years and thereafter until one of the treaty powers should give one year's notice of desire to terminate it. Japan gave notice of abrogation on October 23, 1940 and the treaty was terminated on October 23, 1941.

A provisional fur seal agreement was entered into by the United States and the Dominion of Canada on December 19, 1942, and a new Alaska fur seal law, giving effect to the provisional agreement, was approved on February 26, 1944. With enforcing legislation by the Canadian government, the agreement provides, among other things, for continuation of the prohibition on pelagic sealing, and for delivery to Canada of 20 per cent of the skins taken on the Pribilof Islands, the remainder to be retained by the United States.

The international cooperation afforded by the treaty of 1911 and the provisional agreement of 1942 has resulted in the most outstanding of all accomplishments in the conservation of wild life. Since 1911 the herd has steadily increased until it numbers more than 3,000,000 animals. In this same period about 1,500,000 seals were killed for their fur. This almost phenomenal growth has been possible only through careful management, taking into consideration all phases of the seal's natural history. Were it not for the polygamous nature of fur seals, the birth of both sexes in equal proportions, and the early maturity of the females, the herd would still be of almost insignificant size.

The convention of 1911 during the 30 years it was in effect afforded protection to the Robben

COMPUTATION OF PRIBILOF ISLANDS FUR SEAL HERD AND NUMBER OF SEALSKINS TAKEN BY THE GOVERNMENT, 1910–1949

Year	Sealskins obtained	Animals in herd	Year	Sealskins obtained	Animals in herd
1910	12,964	132,279	1930	42,500	1,045,101
1911	12,138	123,600	1931	49,524	1,127,082
1912	3,191	215,738	1932	49,336	1,219,961
1913	2,406	268,305	1933	54,550	1,318,568
1914	2,735	294,687	1934	53,470	1,430,418
1915	3,947	363,872	1935	57,296	1,550,913
1916	6,468	417,281	1936	52,446	1,689,743
1917	8,170	468,692	1937	55,180	1,839,119
1918	34,890	496,432	1938	58,364	1,872,438
1919	27,821	524,235	1939	60,473	2,020,774
1920	26,648	552,718	1940	65,263	2,185,136
1921	23,681	581,443	1941	95,013	2,338,312
1922	31,156	604,962	1942	150	2,585,397
1923	15,920	653,008	1943	117,164	2,720,780
1924	17,219	697,158	1944	47,652	2,945,663
1925	19,860	723,050	1945	76,964	3,155,268
1926	22,131	761,281	1946	64,523	3,386,008
1927	24,942	808,870	1947	61,447	3,386,008
1928	31,099	871,513	1948	70,142	3,837,131
1929	40,068	971,527	1949	70,891	

Island herd, then under the jurisdiction of Japan, and to the Commander Islands herd belonging to Russia. The Robben Island herd was estimated to contain 40,000 seals and the Commander Islands herd 100,000 when the treaty was terminated.

Natural History.—The hardy old males or bulls are the first to arrive at the Pribilof Islands in the spring, often hauling out on shore before the snow has disappeared. Each selects his summer home at a place along the shore where he may induce the greatest number of females or cows to join him. The younger, less experienced bulls are forced to take up their places at less advantageous points along the shore and consequently they acquire for their harems fewer cows. A family group or harem may comprise as many as 100 cows to one bull. Once a cow has joined the group there can be no amiable separation, and any move toward desertion ends in physical admonition for the wayward wife and scars and bruises for the covetous neighbor who tried to lure her into his harem. Nor are immature animals, except the newborn pups, allowed to intrude where the harems are established. The bulls see to that by keeping a constant vigil, unbroken even to obtain food or sleep.

Each fur seal cow gives birth to one young within a few hours after she lands at the islands. Jet black and weighing about 12 pounds at birth, the pups grow rapidly, and by fall are almost as large as their mothers. Breeding takes place soon after the young are born, the period of gestation, therefore, being approximately one year. The females are mature in their second year and give birth to their first pup when three years old. Males mature when about seven years old. Both males and females have a life span of about 15 years. At maturity a fur seal bull weighs about 500 pounds, and a cow about 90 pounds. Pups and cows leave the Pribilofs in November for the southward migration followed later by the other seals as winter approaches. This migration extends to the latitude of southern California, which is reached in December. The northern movement begins soon after the first of the year and the great majority of the animals arrive at the Pribilofs in July.

Fur seals feed on whatever is readily available. On the northward migration herring is important in their diet but many little known species having no commercial value are eaten also. The principal food throughout their range, and one for which a definite preference seems to exist, is squid. There is no evidence that the growing Pribilof Islands fur seal herd is a menace to any existing commercial fisheries.

Because of the polygamous habits of the fur seal and the fact that the sexes are in equal numbers at birth, there are many males unneeded to maintain the herd and provide for its continued growth. Instead of permitting the normal increase of male animals, therefore, this sex is maintained at the most desirable ratio by killing the surplus males for their fur. The fur is most desirable on the 3-year-olds, and from the males of this age group known as "bachelors," come the fur seal coats of the world. The bachelors very considerately segregate themselves from other seals on shore, and the job of killing the right animals thus is made easy. A proper number of the more fortunate 3-year-old males are reserved from killing to be future harem-masters. No female is ever purposely killed.

To carry on sealing at the Pribilofs in the early days, the Russian operators established colonies of natives from the Aleutian Islands on St. George and St. Paul islands where the principal rookeries exist. The descendants of these people, numbering about 500, still live at the Pribilofs and carry on the sealing operations under the direction and supervision of employees of the United States Fish and Wildlife Service. In return for this work they receive all of the necessities of life, including food, clothing, shelter, school facilities, and medical attention; and, in addition, cash payments are made to them for each skin taken.

Most of the skins are taken in July, and after preliminary preparation at the islands, they are shipped to a government-supervised factory in St. Louis where they are dressed, dyed, machined, and finished for sale at public auction to the highest bidder. The process of preparing fur seal skins for market is a difficult one requiring at least three months for each skin. At the end of the process the leather side of the skin has the same soft feel that one associates with the finest type of chamois, and the soft, lustrous fur has become unequalled for beauty and durability.

Hair Seals.—Hair seals are universal in their distribution but occur in sufficient numbers to support important fisheries in only a relatively few, well defined localities. They include the waters along the west coast of Greenland, the coasts of Newfoundland, Labrador, and the Gulf of St. Lawrence; Jan Mayan Island and adjacent waters; Novaya Zemlya Island and adjacent waters, and the White Sea. The Caspian Sea also supports a hair seal fishery. Small isolated groups of hair seals, of local importance only, are found along both coasts of the United States, around the British Isles, among the islands of the south seas, along both coasts of South America, and in Alaskan and Siberian waters. The species of chief importance commercially are the harp seal (*Phoca groenlandica*), the hood seal (*Cystophora cristata*), the harbor seal (*P. vitulina*), and the Caspian seal (*P. caspica*). The ringed seal (*P. hispida*) and the gray seal (*Halichoerus grypus*) also are taken. The harp seal which gets its name from dark markings on its back which resemble a harp, is, both in number of animals captured and value, the species of greatest commercial importance. In years of normal operation, the number of harps killed has equalled or exceeded the number of all other

species combined. It is the seal on which the Newfoundland, Greenland, and Arctic fisheries depend.

The once extensive hair seal fishery of the South Atlantic, South Pacific and Antarctic regions was primarily for the capture and utilization of the elephant seal or sea elephant, the largest member of the hair seal family. This fishery, prosecuted in conjunction with whaling and fur sealing, was exclusively for the oil. Elephant seals were abundant on many of the islands off the southern coasts of South America, Patagonia, the Falkland Islands, the South Shetlands, the South Georgian Islands, and Crozet and Kerguelen islands. The slaughter of these animals in the early years of sealing was without any thought of the future and the inevitable result has been extermination in many places. This fishery now has been abandoned and where this species has been protected, it is showing rapid recuperation.

The Newfoundland hair seal fishery is the most important in the world. For reasons of economic difficulties besetting the industry as well as decimation of the seal herds, this fishery has shown evidence of failing. In 1855, 400 vessels and 13,000 men were engaged in this fishery and took a total of more than half a million seals. Prior to that time there had been a gradual change in the method of sealing, from exclusively shore operations employing nets, to ice skiffs, small schooners, brigs, brigantines, and barks, successively. After 1855 the decline in sailing vessels commenced, and twenty-five years later they were a thing of the past. Steamers appeared in the fishery in 1863, and by 1906 there were 25 steamers engaged in furnishing employment to more than 4,000 men. The number since then has gradually declined and in 1938 only eight steamers and 1,459 men were engaged in sealing. Several disasters in which two sealing steamers were lost in 1940 and one in 1943, with diversion of others to emergency duties during World War II, brought a further decline to this industry, and in 1946 operations were limited to one steamer and four small motor vessels of less than 200 tons each.

The catch of seals through the years has followed a downward trend paralleling that of ships and men employed. Until about 1860, the average annual take of seals was in excess of 500,000. From 1860 until the early part of the 20th century, the catch averaged well above 200,000 annually, but after World War I dropped to an average of less than 125,000. The catches in 1941, 1942 and 1944 were insignificant; the sealing fleet did not operate in 1943 or 1945. This appears to be the closing chapter of another colorful, highly speculative industry replete with adventure, romance, and tragedy.

The principal species taken in the Newfoundland fishery is the harp seal, though hoods are taken in considerable numbers. These animals follow fairly definite routes of migration. Late in October they leave the Arctic ice and migrate south as far as the great Ocean banks off Cape Race. In this migration the harps appear to originate in the vicinity of Hudson Bay and the hoods come from the Greenland shores, the two species meeting off the Labrador coast. Returning north, they again mount the ice about the end of February in the neighborhood of the Strait of Belle Isle. At this time the young are born, and about a month later the hunt begins. Voyages commence early in March with much pomp and ceremony as the vessels sail from St. John's harbor. They cruise in a northerly direction, usually first locating the seals in the vicinity of Funk Island, between 50 and 100 miles off the northeastern coast of Newfoundland. The seals, congregated in great numbers, are rounded up, cut off from open water, and clubbed over the head. When all the seals are killed, the hunters remove the skins with the adhering layers of blubber and drag them back to the ship to be packed into the hold. When a full cargo is obtained the vessel returns to its home port where the skins are unloaded, the blubber removed, and the hides prepared for manufacture into leather.

Hair seals do not have the fine under-fur that characterizes fur seals, and comparatively little use is made of these skins in clothing. The oil extracted from the blubber is used as a lubricant, in the leather industry, and in soap manufacture.

The hair seal fishery of Jan Mayan Island ranks second to that of Newfoundland and was prosecuted by vessels from England, Norway, and Germany. The catch never equalled that of Newfoundland, and signs of depletion developed early. Despite attempts at regulation, this fishery was seriously depleted by the end of the 19th century. Substantial catches are made annually at Novaya Zemlya, and in the White and Caspian seas. Many hair seals are taken annually along the Alaskan and Siberian coasts of the North Pacific and Arctic oceans by native peoples for food and clothing; no commercial fishery of any consequence is carried on in these waters. Bounties are offered for destruction of the harbor seals in parts of Alaska and in some of the Pacific Coast states where they occur in sufficient numbers to be considered a menace to the various species of food fish of commercial importance.

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SEALSFIELD, sēlz'fēld, **Charles,** pseudonym of KARL ANTON POSTL, Austrian novelist: b. Poppitz, Moravia, March 3, 1793; d. Solothurn, Switzerland, May 26, 1864. He early entered a monastery and was ordained in the priesthood, but in 1822 fled to Switzerland and thence to the United States where he lived in 1822–1826 and 1827–1830. In 1829 he edited in New York the *Courier des Etats Unis,* and after 1832 made his residence chiefly in Switzerland, though he visited the United States at intervals. He subsequently engaged in novel writing, his work creating a sensation in Germany. His publications include *Die Vereinigten Staaten von Nordamerika* (1828); *Der Legitime und die Republikaner* (1833); *Lebensbilder aus bei den Hemisphären* (1835–1837); *Das Kajütenbuch* (1840); *Süden und Norden* (1842–1843).

SEALY, city, Texas, in Austin County, 48 miles west of Houston, on the Missouri-Kansas-Texas and the Gulf, Colorado and Santa Fe railroads. It is a trade and market center for cotton and corn. Pop. (1950) 1,942.

SEAMAN, Lazarus, English clergyman: d. probably Sept. 9, 1675. He was born in Leicester early in the 17th century. He was graduated from Cambridge in 1627 and became a teacher, and chaplain to the earl of Northumberland. He became rector of All Hallows, London, in 1642. After 1645 Seaman was engaged in attempts to secure toleration for the Nonconformists, of whom he was one. Their case was presented to Charles I in 1648, and the king complimented Seaman on his ability. During Cromwell's Commonwealth, which followed soon after, Seaman held various offices at Cambridge, but was deprived of them after the restoration of Charles II. The Act of Uniformity and the Five Mile Act (qq.v.) hampered his public work until the Declaration of Indulgence (q.v.).

SEAMAN, Louis Livingston, American surgeon: b. Newburgh, N. Y., Oct. 17, 1851; d. Bronxville, N. Y., Jan. 31, 1932. He was graduated at Cornell University in 1873, at Jefferson Medical College in 1876 and at University Medical College, New York, in 1877. He was resident surgeon in the New York State Emigrant Hospital in 1877–1879; superintendent of the State Emigrant Insane Asylum in 1879–1881 and chief of staff at Blackwell's Island in 1881–1885. He made a tour of the world and special study of the contagious diseases of the Orient in 1886. He was surgeon with rank of major in the American War with Spain; served with the Second Imperial army of Japan in Manchuria in 1905, and was special correspondent of the *Independent* in World War I. His books include *The Real Triumph of Japan* (1906); *Triumphs of Medical Science in Peace and War in Foreign Lands* (1908); *The Tse-Tse Fly and Sleeping Sickness* (1908); *The Aftermath of the Balkan War* (1914).

SEAMAN, sē'man, Sir **Owen,** English writer: b. Sept. 18, 1861; d. London, Feb. 2, 1936. He was educated at Cambridge, in 1888 became lecturer in literature at the Durham College of Science (Newcastle-on-Tyne), and in 1890 was there appointed to the newly-established professorship of literature. In 1897 he was admitted barrister of the Inner Temple. He began contributions in 1894 to the *National Observer,* in 1895 to the *World* and in 1894 to *Punch,* whose staff he joined in 1897, and of which he became editor in 1906. Author of *With Double Pipe* (1888); *Horace at Cambridge* (1894); *Tillers of the Sand* (1895); *The Battle of the Bays* (1896); *In Cap and Bells* (1899); *Borrowed Plumes* (1902); *A Harvest of Chaff* (1904); *Salvage* (1908); *War Time Verses* (1915).

SEAMAN, William, English Orientalist: b. 1606; d. Nov. 7, 1680. He was graduated from Oxford in 1623 or 1624, and from 1628 until his death he was rector of Upton-Scudamore. Shortly after 1628 he went to Constantinople where he entered the service of Sir Peter Wyche, the English ambassador there, who became his patron. During Seaman's stay in the capital, he perfected his knowledge of the Turkish language. This study led him to translate into English a short history of Turkey, published in 1652 after his return to England. At about the same time he was engaged in making a translation of the New Testament into Turkish. This work, the first of its kind, was published in part in 1659 and, in a complete edition, at Oxford in 1666. For the ensuing century and a half Seaman's translation of the Scriptures remained the only one in print. He also wrote a grammar of the Turkish language, published in 1670.

SEAMAN, a person below the rank of officer who is employed in the navigation of a vessel either coastwise or on the high seas. The word "sailor" is broader in meaning than that of seaman, including men employed on inland waters as well as at sea, and in the United States, with a vast area of navigable lakes, sailor is the term more generally used. Seamanship is, of course, as old as navigation, and that originated before the historic period. Although in ancient times vessels were propelled to a great extent by the labor of slaves, chained to the oars they handled, the men engaged in navigating ships were usually free, and the ancient seamen appear to have had more voice in matters affecting the voyage than seamen have today. Commerce by water was the chief source of the wealth which made Tyre and Carthage, and some of the Greek cities in Asia and Europe rich and powerful, and skilful seamen were, therefore, in great demand. Similar conditions prevailed in the more prosperous republics of the Middle Ages and the Northmen who spread their sails in search of lands they could plunder and subdue were sailors and warriors both.

The discovery of America gave a great impulse to seamanship and may be said to have created a new race of sailors, who were also adventurers and whose feats of navigation have never been surpassed for daring, skill and achievement. In the early days of the American colonies and indeed up to the time when manufactures attracted the surplus population of the rural districts, Americans might almost have been called a race of sailors. They sailed around the world in their merchant ships, fighting French privateers and, when nearer home, dodging English revenue cutters, and in this school of varied hardship and adventure they learned the lessons of seamanship as no others had learned it before. Good sailing ability to navigate a ship to the best advantage was almost as requisite as good gunnery in the naval battles of a century ago, and America's splendid naval record of 1800 to 1815, in combat with French, Barbary pirates and British proves that American seamen could both navigate and fight.

The seamen in vessels trading in American ports in the late 19th century were mostly of foreign origin. Scandinavia supplied a large proportion of them and they were excellent sailors. Laws have been enacted regulating the engagement and treatment of seamen, their claims to pay and their discharge and return to the United States, if abroad. Seamen can no longer be beaten with impunity by brutal shipmasters. The authorities, both civil and criminal, are quick to uphold the cause of a seaman who has a real grievance. Merchant seamen make their contract by signing a written agreement called the shipping articles. This must set forth the voyage, the ports at each end and all other matters which are necessary

to an intelligent understanding of the contract. The contract, when signed, is not absolute evidence of agreement on the part of the seaman, who may prove, if he can, that he was induced to sign by fraudulent representations, or while irresponsible. The law provides penalties for violation of the contract by either party; the amount and quality of provisions while on a voyage are regulated by statute, and the master is bound to pay the wages due, unless he can show that the seaman has been insubordinate or inefficient. A seaman refusing, without good cause. such as illness or other disability, to do the work assigned to him may be put in irons while on board and prosecuted in the nearest United States court. If he deserts he may be arrested and punished by forfeiture of wages and imprisonment. He can justify desertion by proof of cruel treatment. If a seaman is discharged without cause and against his will in a foreign port the master can be punished by six months' imprisonment or a fine of $500. If the seaman, who has done his duty, is willing to be discharged abroad, and the master on his part is willing to let the man go, the master must pay him three months' wages beyond what is due, one-third of which amount goes to a fund for the maintenance of American seamen abroad and for bringing them home. It is part of the duty of American consuls to be vigilant in the protection of American seamen, and the master of a vessel must present his papers for examination by the American consul or consular agent in all ports visited and must explain the reasons for the absence of anyone entered in the list of the crew.

Unfortunately many seamen are ignorant of the provisions of law intended to guard them from abuse and imposition, and the dissipation in which many of them indulge when on shore helps to make them easy victims of unscrupulous boarding-house-keepers and shipmasters, who conspire to rob them of advance money and virtually kidnap them on board vessels on which they had no intention of sailing. This evil is undoubtedly winked at, in some instances, by corrupt officials, who presumably receive a share of the proceeds. Some outrage, greater than usual, calls attention at intervals to the wrongs being perpetrated on seamen, and then there is a brief spasm of public anger and talk of prosecution and reform. This dies out, as a rule, without serious action having been taken and matters go on as before. The lot of the American seaman is, however, immeasurably better than it was in the early part of the 19th century, for now the law is on his side, when invoked, whereas formerly all its power was exerted on the side of the shipmaster, however cruel and unscrupulous.

In England also the seaman has had ample legal protection for over half a century, since the passage of the Mercantile Marine Act of 1850, which lays down minute rules for the government of both masters and seamen. The provisions of the act are very similar to the American laws bearing on the same subject.

The decline of the American merchant marine is attributed largely to the fact that, as a sop to American labor unions, laws were passed obliging vessels carrying the American flag to comply with certain regulations tending to increase the pay of the seamen. Because vessel-owners could hire seamen in foreign ports cheaper than in the United States they have chosen almost universally to fly a foreign flag. The World War, with the indiscriminate sinking of neutral craft by German submarines, stimulated the United States government to inaugurate a heavy shipbuilding era, and the consequent demand for American seamen resulted in increased pay and better conditions.

In 1915 the Congress passed a new seamen's act providing improved conditions as to hours, food, sleep, pay, living quarters and terms of service. One clause called for 75 per cent of the crew to be able to understand orders in English. Penalties for desertion were removed and one-half the wages due were made payable on demand at any port; assignments of wages were voided. On the other hand, the seamen can be dismissed for cause, even in a foreign port, by taking certain action before a United States consul, but to deliberately abandon a seaman in a foreign port is punishable criminally. Seamen's quarters are prescribed to be not less than 16 square feet of deck and 120 cubic feet of air space per individual; washing and toilet arrangements are ordered and medical care and attendance.

SEARCH, Right of, so far as it applies to the homes, persons, papers and effects of American citizens, is regulated by the Fourth Amendment to the Constitution of the United States, which provides that the right of the people to be secure against unreasonable searches and seizures shall not be violated. This provision appears also in State constitutions. A magistrate should issue a search warrant only on evidence sufficient for a reasonable presumption that stolen articles, or articles used in violation of law, such as gambling implements, are to be obtained by the search, or that evidence essential to a prosecution for serious crime may thus be secured. An officer holding a warrant for the arrest of a person charged with crime may enter upon any premises where he believes that person to be, but is responsible both civilly and criminally for abuse of his authority. If an officer makes an arrest without lawful authority he is liable for false imprisonment. Persons not charged with crime may be arrested and detained as witnesses.

The extent of the right of search by belligerents of the vessels of neutrals is a much disputed question, and although it has been agitated for over a century it is far from a comprehensive and satisfactory decision. The assertion by Great Britain, during the wars with Napoleon, of the right to search American vessels on the high seas for alleged deserters from the British navy — some of whom were hanged after being taken from an American man-of-war — provoked the War of 1812. When peace was made, although other points in dispute were adjusted, this question was left unsettled, England, at that time, making no further attempt to interfere with American vessels, and the fall of Napoleon removing the causes which had led to England's high-handed measures.

The Declaration of Paris, signed by the plenipotentiaries of France, Russia, Great Britain, Austria, Prussia, Turkey and Sardinia, 16 April 1856, sought to settle the various questions relating to the right of search, declared

privateering abolished, that the neutral flag covered enemy's goods, except contraband of war, that neutral goods, except contraband of war, were not liable to seizure, even under the enemy's flag, and that blockades, to be binding, must be effective. The United States did not assent to this declaration, and matters were in this condition when the American Civil War broke out.

In 1861 a collision between the United States and Great Britain was nearly caused by the unauthorized action of the commander of a Union war vessel, who stopped the British mail steamer *Trent* on the high seas and took from the *Trent* as prisoners Messrs. Slidell and Mason, commissioners of the Confederate States proceeding to Europe. England made preparations for war, but the government at Washington disavowed the stoppage of the *Trent* and released the commissioners. No privateers were chartered by the United States either during the Civil War or the Spanish-American War. In the latter conflict the United States and Spain proclaimed their intention to adhere to the principles of the Declaration of Paris, and this determination was adhered to throughout the war.

The right to search a neutral vessel for contraband of war is universally admitted, this right, however, being confined to private merchant vessels and not applying to ships of war. The exercise of this right must be conducted with due care and regard to the rights and safety of vessels. All civilized powers also exercise the right of stopping and searching and, if cause be found, seizing or destroying, should resistance be shown, a vessel suspected of piracy or slave trading. The right of search came into prominence again in 1914, 1915 and 1916, when Great Britain went to the limit in stopping neutral vessels in near-by waters and taking them to British ports. The action was violently opposed by many American shippers and was the subject of considerable diplomatic correspondence between the United States and British governments. Owing to the fact that American sympathies were mainly pro-British and that the United States joined the Allies in World Wars I and II, the entire question was dropped, and the conditions of right of search remain more indefinite than ever. See Blockade; Contraband; Declaration of Paris.

SEARCH WARRANT is a warrant requiring the officer to whom it is addressed to search a house or other place therein specified for property therein alleged to have been stolen, and if the same shall be found upon such search, to bring the goods so found, together with the person occupying the same, who is named, before the justice or other officer granting the warrant, or some other justice of the peace or other lawfully authorized officer. It should be given under the hand and seal of the justice and dated. The right is now extended to the search for other articles the possession of which is forbidden by law. The Constitution of the United States declares that "the right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the person or things to be seized."

SEARCHLIGHT. A searchlight is an optical device for projecting light to great distances, either as a signal, or to discover and illuminate any object. It consists essentially of: (1) an intense source of light, and (2) an accurately formed mirror that reflects the light into a substantially parallel beam. The source of light was originally a carbon arc, but between 1906 and 1910, the German inventor, Heinrich Beck, developed the high intensity arc that has since been used almost exclusively. The electrodes for this direct-current arc are made of dense, hard, pure carbon that resists burning when the hot electrodes are exposed to the air. The electrodes for 150 amperes are an 11-mm. negative and a 16-mm. diameter positive. The latter has an 8-mm. core that contains fluorides of the rare earths. When the arc is in operation, a hemispherical crater is formed at the end of the positive, and the gas from the fluorides fills this crater. The passage of the current through the gas heats it to a high temperature, and, accordingly, to high brilliance.

It was thought, previous to about 1910, that pure carbon was the ideal light source, since carbon has the highest melting point of all the elements. In addition, carbon is black, and therefore a good radiator. The maximum brightness of carbon is 13,500 candles per square centimeter, but the 150-ampere high intensity arc gives 82,500 candles per square centimeter, or more than six times as much. This arc, in different sized searchlights, may use from 75 to 500 amperes, and for each electrode there is a particular optimum current. Any departure from rated current will cause a degeneration of the arc toward the pure carbon state if the current is too low, and an increase of current will give a noisy and unstable arc.

The original Beck arc used alcohol burners under the exposed ends of the carbons, so as to immerse them in a neutral and nonoxidizing gas. The dense electrodes developed later made this flame no longer necessary.

The lamp mechanism is usually of the full automatic type. It holds the current constant by changing the arc length through motion of the negative electrode. The positive is rotated from 10 to 15 times per minute in order to obtain uniform walls around the crater. The crater is held at the focal point of the mirror by an optical regulator attached either to the lamp or to the searchlight drum.

One of the first successful searchlight reflectors was the Mangin (Alphonse François Eugene Mangin, 1825–1885) mirror. This reflector was made of glass, and had two spherical surfaces that differed in radius of curvature. The edge was much thicker than the center, which made the mirror a heavy and costly article, since optical glass of suitable quality is expensive. Shop methods of grinding paraboloids, in the United States developed by the Bausch and Lomb Optical Company, eventually rendered the Mangin mirror obsolete. Metal mirrors have become common in military practice: they are made either of some type of stainless steel, ground and optically polished, or they are of a composite type made by depositing rhodium on a heavy metallic backing formed on an accurate glass matrix. The change to metal was made because metal is more resistant to bombing and gunfire than glass. In general, however, metal mirrors fall short of the performance of a silver-backed glass mirror. Rhodium has a reflectance of 0.73, as against 0.88 for silvered glass, while the 60-inch searchlight was found

to give only 650,000,000 candles, as against 800,000,000 before the change was made.

The width and intensity of a searchlight beam may be accurately computed if one knows the brilliance and diameter of the crater, and the reflectance, the focal length, and the diameter of the mirror. The maximum strength of beam occurs in the center of the beam, and is proportional to the central brilliance of the crater multiplied by the plane area of the mirror, due allowance being made for losses of light by absorption and obstruction. The beam width is equal to the angular width of the crater as measured from the center of the mirror, which in the 60-inch searchlight is about 1 degree, 15 minutes. In general, the smaller the searchlight, the smaller the arc, and the less the crater brilliance. The beam strength, therefore, falls off at a faster rate than the decreased plane area of the mirror would indicate.

Practically all paraboloidal searchlight mirrors extend to a 60-degree angle on either side of the axis, and only the light that falls within this "acceptance angle" is useful. It is not economical to extend the mirror beyond this limit, since the radiation from the arc falls off rapidly at larger angles, and not much more light can be collected.

A searchlight arc requires complete protection from wind and rain, and a glass door accordingly is placed over the front of the searchlight. The original doors were of solid plane glass, but these developed heat strains due to unequal heating, and they soon cracked. To overcome this defect, the doors were next made of narrow strips of glass carefully fitted to exclude the weather. These, however, were apt to be broken by the shock of near-by gunfire, and recourse was then had to a solid dome-shaped glass door. The surfaces of this door are spherical, since this is the easiest of all curves to grind, and the two spheres are so selected as to have a minimum dispersing effect on the light passing through. The later development of tempered glass made it possible to use flat glass again in some of the larger naval searchlights.

There are small searchlights that are largely used for signaling. These searchlights use incandescent lamps with concentrated filaments. The filaments are arranged in a single plane, with the coils set as close together as possible, so as to simulate a solid surface. Since the highest brilliance of tungsten is only about 1,600 candles per square centimeter, it is evident that there is a wide gap in performance between tungsten and the best arc. The two types are consequently used in quite different ways.

FRANK BENFORD,
Research Laboratory, General Electric Company.

SEARCY, sär'sē, town, Arkansas, and White County seat; 50 miles northeast of Little Rock, on the Missouri and North Arkansas; the Chicago, Rock Island and Pacific; Missouri Pacific; and Missouri and Arkansas railroads. It is in an agricultural area raising cotton, corn, strawberries, and hay. There is considerable timber. The town has stave and sawmills; cotton gin, warehouse, and compress; bottling works and hatchery; pecan shelling plant; shoe manufacturing plant. Harding College is here. The town was incorporated in 1836. Pop. (1950) 6,024.

SEARING, Laura Catherine Redden (HOWARD GLYNDON), American author: b. Somerset, Md., Feb. 9, 1840; d. Aug. 10, 1923. At 10 she lost the power of hearing and of speech through illness, and was educated at the Missouri Institute for Deaf-Mutes. Later she largely regained the faculty of speech at Clark Institution, Northampton, Mass. She was married to Edward W. Searing in 1876. Her literary career began when she was 18, and during the Civil War she was a newspaper correspondent at Washington. In 1866–1867 she was in Italy as correspondent for the New York *Times* and also engaged in literary work for the Department of Agriculture. During the Franco-Prussian War she wrote *German War Gossip* for the New York *Tribune,* was on the staff of the New York *Mail* in 1868–1876. She published *Notable Men in the "House"* (1862); *Idyls of Battle* (1864); *Sounds from Secret Chambers* (1873). Her daughter published a complete edition of her poems, *Echoes of Other Days,* in 1921.

SEARLE, sėrl, **George Mary,** American clergyman: b. London, England, June 27, 1839; d. July 7, 1918. He came to the United States in 1840; was educated at Brookline High School and at Harvard University, being graduated at the latter institution in 1857. He was computer for the *Nautical Almanac* in 1857 and assistant at the Dudley Observatory, Albany, N. Y., in 1858–1859. In 1859–1862, he was engaged as computer in the United States Coast and Geodetic Survey and in 1862–1864 was assistant professor of mathematics at the United States Naval Academy. In 1866–1868 Mr. Searle was assistant at the Harvard Observatory. He entered the Paulist order in 1868 and was ordained in 1871. In 1895–1897 he was professor of mathematics at the Catholic University, Washington, D.C.; in 1904–1910 was superior general of the Paulist Fathers; in 1910–1911 was engaged in astronomical observations, particularly relative to Halley's Comet, at Newman Hall, University of California. In 1911–1915 Father Searle was stationed at Saint Mary's Church, San Francisco, and after 1915 at the Apostolic Mission House, Brookland, Washington, D.C. He published *Elements of Geometry* (1877); *Plain Facts for Fair Minds* (1895); *How to Become a Catholic* (1905); *The Truth about Christian Science* (1916), and contributed to periodicals.

SEARS, Barnas, American theologian and educator: b. Sandisfield, Mass., Nov. 19, 1802; d. Saratoga Springs, N. Y., July 6, 1880. He was graduated at Brown University in 1825 and later studied at Newton Theological Seminary. He was professor at Hamilton Literary and Theological Institute (now Colgate University) 1831–1833, and afterward studied in Germany, where he assisted in establishing Baptist missions. He was professor and, later, president of Newton Theological Seminary; and in 1855–1867 he was president of Brown University. He was general agent of the Peabody Educational Fund from 1867 until his death. For some years he edited the *Christian Review.* Author of *The Life of Luther* (1850); and several textbooks and translations.

SEARS, Edmund Hamilton, American Unitarian clergyman and poet: b. Sandisfield, Mass., 1810; d. Weston, Mass., Jan. 14, 1876. He was graduated at Union College in 1834 and at Harvard Divinity School in 1837. He was

pastor at Wayland, Mass., in 1839–1840; at Lancaster, Mass., in 1840–1847; editor of the *Monthly Religious Magazine* in 1847–1865; and after 1865 was pastor at Weston, Mass. Author of *Regeneration* (1853); *Pictures of the Olden Time* (1857); *Christian Lyrics* (1860); and *The Fourth Gospel: the Heart of Christ* (1872), his most notable work.

SEARS, sērz, **Isaac,** American patriot: b. West Brewster, Mass., July 1, 1730; d. Canton, China, Oct. 28, 1786. He descended from Richard Sears, who emigrated from Colchester, England, in 1630, and settled in Massachusetts. He was in command of a privateer against the French in 1758–1761, and after losing his vessel settled in New York and engaged in the West Indian and European trade. He became a prominent member of the Sons of Liberty, and was chairman of the first committee of correspondence established in New York. He commanded the troop that raided the printing establishment of James Rivington, editor of the *Royal Gazette*. After destroying the presses, the types were carried away to be cast into bullets. He was a member of the provincial congress in 1783, and also of the State assembly of New York. Having lost his fortune, he shipped as supercargo on a merchant vessel and contracted a fever on the voyage to China, from which he died.

SEARS, Joseph Hamblen, American author and publisher: b. Boston, Mass., April 10, 1865; d. Kingsport, Tenn., Feb. 15, 1946. He was graduated from Harvard in 1889, and later published, among other works, *The Governments of the World Today* (1893); *None But the Brave* (1902); and *Leonard Wood* (1916).

SEARS, Lorenzo, American rhetorician: b. Searsville, Mass., April 18, 1838; d. Providence, R. I., Feb. 29, 1916. He was graduated from Yale in 1861, from the General Theological Seminary, New York, in 1864, and was engaged in pastoral duties in New England in 1864–1885. He was appointed to the chair of rhetoric and English literature at the University of Vermont in 1885, which he filled until 1890, when he occupied that of rhetoric and American literature at Brown University until 1906. He has published *History of Oratory* (1896); *The Occasional Address, Its Literature and Composition* (1897); *Principles and Methods of Literary Criticism* (1898); *American Literature in the Colonial and National Periods* (1902); *Seven Natural Laws of Literary Composition* (1904); *Makers of American Literature* (1904); *Wendell Phillips, Orator and Agitator* (1909); *John Hancock, the Picturesque Patriot* (1912); *John Hay, Author and Statesman* (1914).

SEARS, Taber, American artist: b. Boston, Mass., 1870; d. New York City, Oct. 18, 1950. He was educated at the Boston Museum of Fine Arts, School of Arts and at the Jullian Academy, Paris, and studied under Jean Paul Laurens and Luc Olivier in Paris, as well as studying at Rome and Florence. He has specialized in mural paintings and in designs for stained glass windows. His mural paintings include *The Spirit of Niagara* (Buffalo Historical Society); *Among the Nations* (New York City Hall); frieze of the Apostles (Epiphany Church, Pittsburgh), etc.

SEARSPORT, town, Maine, in Waldo County; altitude 50 feet; about 30 miles southwest of Bangor; terminus of the Bangor and Aroostook Railroad. Its chief industries are boat building, ice-gathering and shipping potatoes. It was a seaport of importance in the days of sailing vessels. The Penobscot Marine Museum contains many relics and papers of the days when the town was a shipbuilding and marine center. The home of Lincoln Colcord, well-known writer of sea stories, is here. Pop. (1940) 1,319; (1950) 1,457.

SEAS, Freedom of, a term of international law and diplomacy employed to describe the legal nature of the high seas, in respect to the right of every nation to navigate their waters freely beyond a certain limit, usually three miles from the coast, without being subject to the control of any nation. This freedom, now so well established, was not universally recognized in earlier times. As late as the 15th century Portugal asserted sovereignty over the Indian Ocean, and a large part of the Atlantic Ocean south of Morocco, while Spain asserted an equal right over the Pacific and the Gulf of Mexico, and the pope supported their claims. In later times Great Britain asserted extravagant claims over the English Channel and certain great arms of the sea which washed the shores of the British Isles. Still later other nations, from time to time, asserted more or less jurisdiction over certain waters of the open seas. Thus the United States undertook to exclude other nations from killing fur seals in the Bering Sea many hundreds of miles from the American coast, but the question having been submitted to an international tribunal of arbitration, the tribunal decided against the American claims. Some nations claim and exercise jurisdiction in respect to fisheries and revenues over their littorals extending far beyond the three mile limit, and although this assertion has occasionally produced irritation and conflict it has usually been acquiesced in. Formerly certain nations claimed and exercised the right to control great bodies of the open sea connected by straits within their jurisdiction. The claims asserted by Denmark over the Baltic Sea were a well-known instance, and her claims were not finally abandoned until the middle of the 19th century.

Hugo Grotius in his *Mare Liberum* published in 1609 in answer to John Selden's attack upon the freedom of the seas revived the doctrine of the Roman law that there could be no property in anything which could not be effectually occupied; hence the oceans were free to the navigation of all, subject to the control of no nation. Since Grotius' time the general principle of the freedom of the seas in time of peace has been universally recognized and except for the depredations of pirates and slave traders it has been generally enjoyed for purposes of navigation. This, of course, does not mean that a nation cannot restrict the maritime trade between its own continental ports or between itself and its colonies to its own citizens and to vessels flying its own flag, or that it cannot prescribe conditions under which foreign ships may enter or depart from its own ports. What freedom of the seas in time of peace means is the right of the ships of all nations to navigate freely the high seas outside the ter-

ritorial waters and beyond the three-mile marginal sea without being subject to the right of search or molestation by the vessels or authorities of any nation.

In time of war no such freedom of navigation is recognized. This freedom is limited by the admitted right of belligerents to intercept and confiscate articles of contraband on their way to the enemy and to prevent by means of lawful blockade all intercourse or trade in any and all goods, whether contraband or not, with the enemy. To this end, the public vessels of a belligerent may stop and search on the high seas any neutral vessel with a view to ascertaining its nationality as well as the character and destination of its cargo and, under certain conditions, both may be confiscated or even destroyed. During the World War certain belligerents, notably Great Britain, went to the length of taking neutral vessels into distant ports for the purpose of conducting the searches, against all of which neutral governments vigorously protested. Mails from neutral steamers were likewise taken in, searched, censored and detained. Many neutral vessels were also stopped and persons of enemy nationality were taken off and imprisoned. Mines were sown in the open seas, first by Germany and then by Great Britain, and a goodly number of neutral merchant vessels innocently navigating the high seas were destroyed. Germany, and to a less extent Great Britain, also declared great areas of the open seas to be war zones, "barred zones," "danger areas" and the like (see WAR ZONES). The zones proclaimed by Great Britain could only be navigated with great danger and the Germans even went to the length of deliberately sinking all ships which entered the zones proclaimed by their government. In the enforcement of their blockade measures Great Britain and France applied the doctrine of continuous voyage or ultimate destination to trade with the enemy through neutral ports and thus effectually, it was charged, blockaded neutral ports. The doctrine of contraband was extended to include nearly everything that could be carried by sea, the distinction between conditional and absolute contraband was abolished and the rule of ultimate destination was applied to both classes of contraband without distinction (see CONTRABAND). The German government went even further and systematically sunk many hundreds of neutral vessels, including even fishing vessels, hospital ships and those engaged in missions of mercy and philanthropy, in spite of the immunity which international law assures them. By these and other acts the principle of the freedom of the seas, as it has been heretofore understood, was seriously infringed upon and loud protests were made by neutrals. The German government likewise never ceased to denounce the conduct of Great Britain and maintained that it was fighting for the freedom of the seas — a profession which in virtue of its own lawless conduct was more hypocritical than sincere.

While the United States was still a neutral the President denounced these infringements upon the freedom of the seas, and in an address to the Senate declared that the "paths of the sea must alike in law and in fact be free" and that "the freedom of the sea is the *sine quâ non* of peace, equality and co-operation." As one of the 14 conditions of peace which he announced to Congress on 8 Jan. 1918 was the following: "Absolute freedom of navigation upon the seas, outside territorial waters, alike in peace and in war, except as the seas may be closed in whole or in part by international action for the enforcement of international covenants." It was pointed out at the time that the seas were already free in time of peace and his proposal must, therefore, apply only to the freedom of the seas in time of war. There was a difference of opinion as to the exact meaning of the proposal for "absolute" freedom of navigation and it was the subject of much discussion. Literally interpreted it would mean the abolition of the belligerent right of blockade, at least of commercial blockade, the right to seize contraband of war going to the enemy, the surrender of the right to prevent unneutral service and perhaps of the right to capture enemy private property at sea and to destroy enemy merchant vessels. Great Britain and France in their replies to the President's proposals accordingly stated that since the point relating to the freedom of the seas was "open to various interpretations," some of which they could not accept, they must, therefore, "reserve to themselves complete freedom on the subject when they enter the peace conference." It is obvious that a freedom of the seas which would deprive a belligerent of these weapons would amount in effect to a prohibition of naval warfare altogether and would place a naval power in a position of great disadvantage in comparison with a military power. It is well known that the exercise of these rights contributed more than anything else to the defeat of the Confederacy during the Civil War and it is doubtful whether without them the Allies could have forced Germany into submission during the World War. There seems little likelihood, therefore, that the great naval powers, including the United States, will be willing to pay such a price for an absolute freedom of the seas. Much may be said and has been said in favor of the immunity of private property from capture at sea and even in favor of the abolition of purely commercial blockades. The British government even went to the length of proposing at the second Hague Conference that contraband be entirely abolished and that neutrals be allowed to carry without molestation what they will to belligerents, and this proposal received the support of 26 states. But as yet no agreement has been reached and it does not seem likely that as to some of the proposals any agreement will be reached in the near future. As the term is now understood, therefore, freedom of the seas in time of war means nothing more than the liberty of neutrals to trade with belligerents subject to the long-established restrictions in respect to blockade and contraband. To be sure, these restrictions should be more precisely defined and limited so as to prevent in the future such grave infringements as were committed upon the rights of neutrals during the late war. As to the rights of belligerents to sow mines in the open seas beyond their territorial waters, to assert control over great areas of the sea under the name of "war

zones," and to destroy systematically and generally neutral merchant vessels, they should be forbidden altogether. These measures would not ensure "absolute" freedom of the seas but they would remove the most irritating sources of controversy, which is probably all that can be expected for the present. After the war the subject of the freedom of the seas was avoided at the Washington Conference of 1922, and at the Geneva Conference of 1927. No definite action towards clarifying the points at issue was taken by the League of Nations.

Consult Grotius, Hugo, *Freedom of the Seas;* Ormond, S. W. T., *The Law of the Sea;* Corbett, Sir Julian, *The League of Peace and a Free Sea;* Anderson, C. P., "Freedom of the Seas" in *Annals of the American Academy of Political and Social Science,* July 1917.

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SEASHORE, Carl Emil, American psychologist: b. Mörlunda, Sweden, June 28, 1866; d. Lewiston, Idaho, Oct. 16, 1949. He was graduated at Gustavus Adolphus College, St. Peter, Minn., in 1891 and from Yale University in 1895. He was assistant in the Psychological Laboratory at Yale in 1895–1897; and from 1897 was associated with the faculty at the University of Iowa, where he was professor of psychology from 1902, head of the department of philosophy and psychology 1905–1937, and dean of the graduate college, 1908–1936. He invented many psychological instruments, among them the voice tunoscope, spark chronoscope, psycherogograph, audiometer, sound perimeter and multiple recorder, and originated the Seashore Measures of Musical Talents in 1919 (revised, 1939). He edited the University of Iowa's *Studies in Psychology;* was joint editor of the *Journal of Educational Psychology;* and consulting editor of the *Psychological Review.* He was author of *Psychology in Daily Life* (1913); *The Psychology of Musical Talent* (1919); *Introduction to Psychology* (1922); *A Preview of College and Life* (1938); *Why We Love Music* (1941); *In Search of Reality in Music* (1947).

SEASICKNESS, an affection attended with nausea and other disagreeable sensations produced by the motion of a vessel. Its causes and etiology are as yet imperfectly understood. Some refer it to causes dependent upon the altered or affected functions of the nervous centers; others to the regurgitation of bile into the stomach; and still others to irritation of the liver by the unusual movements of the body, increased secretion of bile being secondary. Probably each of these views contains something of the real explanation of the disorder.

When a landsman goes to sea, the movements of the ship, and the shifting lines and surfaces, unsettle his visual stability, as the different inclinations of the plank he stands on unsettle his muscular sense. The consequent derangement of these faculties reacts upon the nervous centers and through the latter upon the viscera, thus producing nausea and vomiting. Recollection of the disturbing sensations, together with the emotional state which they originally excited, may itself become an efficient cause, at least in individuals, of peculiarly irritable stomachs, or of highly sensitive nervous systems; for this plays downward upon the sensorial centers in such a manner as to excite in them the same condition as that which was originally produced through the medium of the sensory nerve. This may explain why certain individuals show all the symptoms of seasickness on going aboard a vessel perfectly at rest. So, no doubt, imagination is a potent and important factor in the case. The fact that visual impressions predispose travelers to seasickness suggests that a susceptible individual might do well to close his eyes, when on deck, and thus overcome this unpleasant sensation.

But perhaps the chief causes of seasickness may be summed up thus: (1) Effusion of blood to the brain; (2) disturbance of the digestive system; (3) over-eating, and also under-eating. Many preventive measures referring to the construction and arrangement of vessels have been tried with little success; yet experiments with vessels having a swinging saloon, designed to preserve equilibrium in any sea, and vessels with a breadth intended to minimize the rocking motion, show that nautical men and shipbuilders are becoming alive to the interests and comfort of travelers. Preventive measures regarded from the patient's point of view are practically limited to the regulation of diet before a voyage. The diet for some days previously should be plentiful, but of light and nutritious character. Above all, the bowels should not be constipated and food should not be taken for at least five or six hours before going on board, although a cup of strong coffee just before embarking will prove beneficial as a slight stimulant. On the ship a position as near the center as practicable is to be preferred.

Three or four drops of chloroform on lump-sugar may prevent vomiting and a suitable dose of bromide of soda and antipyrine will often give further relief. Many medical men consider that if drugs must be taken, the best all-around remedy is chlorobrom (not chloroform), a compound of chloralamide and bromide of potassium, while some prefer five grains of bromide of ammonia.

SEASIDE, unincorporated village, California, in Monterey County, altitude 4-400 feet; on the Southern Pacific Railroad, three miles east of Monterey. Situated on the south shore of Monterey Bay at the base of the Monterey Peninsula, it is mainly a residential community. Founded in 1900, its government is by local districts and through county supervisors. Pop. (1950) 10,226.

SEASONS, the four grand divisions of the year. Spring is from the vernal equinox, when the sun enters Aries, to the summer solstice; summer is from the summer solstice to the autumnal equinox; autumn is from the autumnal equinox to the winter solstice; winter is from the winter solstice to the vernal equinox. The earth's axis is inclined to the plane of the ecliptic at 66½ degrees, and as the earth moves round the sun in the course of a year, the northern hemisphere is turned to the sun in summer (most so at the summer solstice); at the equinoxes the line of light and shade on the earth passes through the poles, and at the winter solstice the Northern Hemisphere is turned from the sun. It is evident that the characters of the seasons are reversed to inhabitants of the Southern Hemisphere. See AUTUMN; EARTH; SUMMER; SPRING; WINTER; METEOROLOGY.

SEASONS, The, a poem in blank verse by James Thomson (q.v.), which has been characterized as "the classic of descriptive poetry." The evolution of the poem is traced in *Winter,* published in 1726; *Summer,* 1727; *Spring,* 1728; and *Autumn,* 1730. In 1744 the poet issued a new edition with extensive additions and alterations as *The Seasons.* Departing from the severe classic style of Pope and his school, Thomson relied solely on an appeal to the external beauties of nature, and by simplicity and truthfulness inaugurated a new era in English poetry which gathered strength in Gray and Cowper and culminated in Wordsworth. Not only in England was he imitated by his contemporaries—notably by Goldsmith in *The Deserted Village*—but numerous translations appeared on the continent of Europe, while in *Les Saisons,* Saint-Lambert (1716–1803) copied Thomson in a poem praised by Voltaire, and which was popular for half a century.

SEATON, Sir John Colborne, 1st Baron of. See Colborne, Sir John.

SEATON, William Winston, American journalist: b. King, William County, Va., Jan. 11, 1785; d. Washington, D.C., June 16, 1866. He engaged in journalism at 18 and edited various newspapers until 1812 when he became associated with his brother-in-law, Joseph Sales, Jr., with whom he was editor and owner of the *National Intelligencer* at Washington. From 1860, until just prior to his death, he was sole editor and manager. In 1812–1820 Seaton and Gales were exclusive congressional reporters, one attending the sessions of each house. Their publications are highly authoritative and of great historical value. They include *Annals of Congress, Debates and Proceedings of the Congress of the United States from March 3, 1798, till May 27, 1824,* 42 vols., (1834–1856); *Register of Debates in Congress from 1824–1837,* 29 vols., (1827–1837); *American State Papers,* 21 vols., (1832–1834).

Consult the *Life* by his daughter (1871).

SEATTLE, Wash., largest city of the Pacific Northwest, county seat of King County, important seaport, and the world's youngest city of its size, is situated on the eastern shore of Puget Sound, between Elliott Bay on the west and Lake Washington on the east; 865 miles by water north of San Francisco, Calif., 185 miles by rail north of Portland, Oreg., 123 miles by rail south of the Canadian boundary. The city area is 104.41 square miles, of which 35.91 square miles are water.

Population.—The population of Seattle in 1870 was 1,107; in 1880, 3,533; in 1890, 42,837; in 1900, 80,671; in 1910, 237,194; in 1920, 315,312; in 1930, 365,583; in 1940, 368,302; and in 1950 467,591.

Location.—Seattle's setting is one of great natural beauty, looking to the west across the wide reaches of Puget Sound to the lofty, rugged range of snow-capped Olympic Mountains. To the east, across Lake Washington, the foothills rise sharply to the Cascade Range with major peaks—Mount Baker (10,750 feet), Glacier Peak (10,436 feet), and Mount Rainier (14,408 feet)—visible from many parts of the city. Since these majestic peaks are viewed from approximately sea level, they are most impressive. Lake Washington, 22 miles long, 4 miles wide, 225 feet maximum depth, and with a shore line of 80 miles bounds the city entirely on the east.

The general contour of Seattle is hilly, ranging from sea level to 514 feet on the West Seattle crest. Queen Anne Hill, a prominent residential district, is 464 feet above sea level. The valleys have a general north and south trend, and the "seven hills" upon which the city is built include First, Beacon, Capitol, Queen Anne, Wallingford, Madrona, and West Seattle hills.

Cable and electric railroads that once served the city have been replaced by modern trackless trolley cars and mobile busses, operating on 300 miles of streets. By regrading, some of the hills obstructing business districts have been leveled and earth has been removed to fill low places and tidelands now forming some of the principal industrial districts and locations. More than 34,000,000 cubic yards of earth have been moved, largely by hydraulic process, and hills up to 130 feet in height have been leveled. The main business district occupies the relatively level area paralleling the waterfront on Elliott Bay and terraced up to about 8th Avenue. The general residential districts are on hills and slopes providing perfect drainage and a wide variety of mountain and water views. While there are numerous modern apartment houses, the great majority of homes are detached dwellings with yards attractively planted with shrubbery and flowers. In addition to Lakes Washington and Union, Green Lake, about 4 miles in circumference, in the north-central district of the city, is surrounded by parks, playfields and charming residences.

Climate.—The prevailing air currents which reach Seattle from the Pacific Ocean give the city a mild and moderately moist climate. The temperature reaches 90 degrees or more on the average of only once per year, and the city has no record as low as zero. The average daily minimum temperature in January is 36 degrees, while the average daily maximum in July is 74 degrees. The normal annual precipitation over a 50-year period is 34 inches, mostly as rain, distributed over 149 days of measurable amounts. The city experiences no extremes of heat or cold, floods or droughts.

Government.—The city government is by a mayor and 9 councilmen, elected every four years, with comptroller, treasurer, corporation counsel, and various boards, commissions and departments.

The municipal water supply is pure mountain water impounded on Cedar River in the Cascade Range. Reservoirs have a capacity of 365,370,000 gallons; daily consumption averages 79,700,000 gallons.

Seattle City Light is the second largest municipal plant in the United States, with a hydro capacity of 224,000 kw. and steam capacity of 38,000 kw. Additions under construction in 1950 were expected to provide a total capacity of 572,000 kw. by 1953, and of 712,000 kw. by 1956. City Light also provides power for Seattle's municipally owned transit system, operating over 300 "trackless trolley" cars.

Public Buildings.—Seattle has 250 churches, including Chinese, Japanese, Finnish, Jewish, Scandinavian, German, and White Russian, and is the see of the Roman Catholic bishopric of Seattle. Among the attractive religious edifices

are Saint James Cathedral, Saint Mark's Cathedral, Plymouth Congregational Church, First Baptist Church, First Church of Christ Scientist, First Presbyterian Church, University Temple, and Temple de Hirsch. Among other public buildings of note are the Civic Auditorium, Armory, L. C. Smith Building with its 42-story tower, Olympic Hotel (built at cost of $5,000,000), Medical-Dental Building, Dexter Horton Building, County-City Building, Public Safety Building, Telephone Building, Northern Life Tower, Shopping Tower, Exchange, Alaska and Central Buildings, Arctic Club, Washington Athletic Club, Sunset Club, Rainier Club. Among the leading theater buildings are the Orpheum, Metropolitan, Fifth Avenue, Paramount, and Music Hall.

Public Markets.—The public markets of Seattle are noted attractions for visitors, and are well patronized by residents. Here may be found fresh produce from the many farms and gardens surrounding the city or brought from the islands or mainland across the sound over the network of ferries operating from the port. Fish markets and seafood eating houses are found on the waterfront, where salmon, halibut, sole, the famous Dungeness crabs, many kinds of oysters and clams, and other salt-water fish may be procured.

Industries.—The growth of Seattle's industries has kept pace with its growth in population. According to the United States Census of Manufactures (1947), there were 1,221 industrial establishments in the Seattle Metropolitan area, employing 54,770 persons who received salaries and wages totaling $171,221,000. Diversification of manufacture is indicated by classification into lumber products, furniture, stone, clay, glass, metals, metal products, machinery, electrical equipment, aircraft, transportation equipment, instruments, foods, textiles and apparel, pulp and paper products, printing and publishing, chemicals, rubber products and leather goods. The city's largest industrial plant, the Boeing Airplane Company, has 18,000 employees and a plant investment of some 40 million dollars.

Foreign Trade.—The unexcelled harbor of Seattle and its strategic location have been particularly favorable to the development of waterborne commerce. From the early days when windjammers sailed into Elliott Bay for lumber and carried trade to the seven seas until the era of huge steamers and motorships, Seattle has been important in foreign trade.

By the northern trade routes, Seattle is 1,100 miles nearer to Japan than are the California ports, whose ships follow the southern routes via Hawaii. During the period between World Wars I and II, swift vessels plying between the Orient and Seattle brought rich cargoes of silk which were rushed by fast freight to manufacturing centers on the Atlantic coast.

While World War II and subsequent unrest in the Orient affected trade with those countries, Seattle's water-borne commerce in 1949 carried 479,884,568 pounds of imports and 468,380,816 pounds of exports. These imports were received from 46 different foreign countries, while exports left the port for 72 different countries. Leading imports in order of poundage were: paper and newsprint, fruit and fruit preparations, bananas, unmanufactured wood, tinplate, turnplate, scrap iron, nonmetallic minerals, sawmill products, cocoa, coffee, tea, chocolate, coal and related fuels, coal tar products, and vegetable fibers. Leading exports were: grains and preparations, wheat flour, coal and related fuels, steel mill products (ingots, billets, bars, and sheets), sawmill products (lumber), logs, posts, poles, pilings, building cement, and petroleum products.

Banks.—Some fifteen banking houses are represented in Seattle, a number of which have branches in various districts. One bank, the Seattle-First National, has 12 branches in the city and 48 banking offices in the State of Washington. There is also a Federal Reserve bank. Total bank clearings in 1949 in Seattle were $5,794,612,496.

Transportation.—Seattle is served by four transcontinental railroads — Great Northern, Northern Pacific, Union Pacific, and Chicago, Milwaukee, St. Paul and Pacific, with their various connections. Several important steamship lines reach the city. Seattle is on the Pacific Highway (US 99) and connects with various east-west highways and with many stage and trucking lines. It is the terminus for a number of important airlines serving the United States, Canada, Alaska, Hawaii and the Orient.

Canals and Bridges.—Lake Washington is connected with Puget Sound by a ship canal more than 8 miles long, 150 feet wide, and with 36 feet depth of water. Between lake and sound it connects through Lake Union, in the heart of the city, 2 miles long by ¾ mile wide, affording additional dock facilities. Lakes Washington and Union are on the same level, but the fresh waters of the latter are joined with the salt waters of Puget Sound through a set of locks, second in size only to those of the Panama Canal—with one chamber 80 by 825 feet and another 30 by 100 feet, with a depth of water from 36 to 42 feet. The larger chamber requires 25 minutes and the smaller 15 minutes for the passage of a ship. This canal, opened in 1916, extended Seattle's waterfront from 40 to 140 miles, adding a fresh water, nontidal harbor unique in the world. Through straightening the Duwamish River at the south end of Elliott Bay, another artificial waterway 5 miles long, 300 feet wide, and 30 feet deep at low tide taps a level district that is becoming an important manufacturing section.

A floating bridge (completed in 1940) of concrete pontoons, considered one of the engineering wonders of the world, spans Lake Washington from the city to Mercer Island and thence across the East Channel and Mercer Slough to the eastern shore, forming one of the principal highway entrances to Seattle. The Lake Washington floating bridge is 6,500 feet in length, 60 feet in width, and has 25 concrete pontoons, anchored with 65 special steel cables. The depth of water under this bridge is 210 feet, but in a 55-miles-per-hour wind the lateral movement is only 6 inches, with no measurable vertical undulation. The George Washington Memorial Bridge, on Aurora Avenue, spanning the Lake Washington Ship Canal at the west end of Lake Union, has a vertical clearance of 135 feet to permit passage of the tallest ships. Several drawbridges also span the canal.

The Port of Seattle.—Seattle's major harbor and airport facilities are administered by the Port of Seattle, a municipal corporation embracing a territory with boundaries the same as King County, but independent of city, county or

SEATTLE: *Above:* The waterfront photographed from a hill back of the town in 1881. *Below:* Aerial view of a sector of the waterfront 75 years later. *Right:* The 42-story Smith Tower Building, one of the Pacific coast skyscrapers. *Bottom:* Opening day of the Regatta on Lake Washington with distant view of the Cascade Mountains.

(Above) Wide World Photo; (right and below) Deane Dickason and Spence Air Photos from Ewing Galloway, N. Y.; (bottom) Harold M. Lambert from Frederic Lewis

Above: Lake Union, a freshwater lake in the heart of the city. The Lake Washington Ship Canal, second in size only to the Panama Canal, connects Puget Sound with Lake Washington through Lake Union.

Left: A tug tows a huge raft of logs through Seattle on its way to Puget Sound lumber mill.

Below: The Seattle Art Museum in Volunteer Park. The entrance is guarded by two marble rams and two camels taken from the tomb of a prince of China's Ming dynasty.

(Above and below) Spence Air Photos and Deane Dickason from Ewing Galloway, N.Y.; (left) Wide World Photo

state agencies. It is governed by a board of three port commissioners, elected for six-year terms. Of more than 80 piers and terminals operated on the Seattle waterfront, it owns eight of the largest. It also owns and operates Foreign Trade Zone No. 5, the huge Seattle-Tacoma International Airport at Bow Lake, located between Seattle and Tacoma, and the Salmon Bay Fishing Terminal.

By reason of its strategic geographic location on the great circle routes, Seattle is the closest American port to the Orient, Hawaii, and Alaska, and has one of the best natural, protected harbors in the world. It is 125 nautical miles from the Pacific Ocean by waters that are wide, deep and free from hazards to navigation. The entrance at the Strait of Juan de Fuca is 15 miles wide, and the width of the channel to Seattle varies from 3 to 25 miles in width and from 25 to 150 fathoms in depth. There are two harbors at Seattle, one of fresh water including Lakes Washington and Union, with an area of 51 square miles and a shoreline of 140 miles. The salt-water harbor consists of Elliott Bay, East, West and Duwamish waterways, and portions of Puget Sound. The total salt-water harbor area is 5,300 acres with a shore frontage of 54 miles. Here may be seen craft of every size and kind from majestic ocean liners to private yachts and commercial fishing boats.

In 1949, Foreign Trade Zone No. 5 was established. It is maintained and operated by the Port of Seattle as a service to foreign traders. Here goods from foreign countries may be entered without payment of duty, stored indefinitely, manipulated in almost any way, and reshipped abroad with no duty on re-export.

Airport.—Also under the management of the Port of Seattle is the Seattle-Tacoma International Airport, dedicated in 1949 and acclaimed one of the world's finest airports. This terminal, constructed at a cost of $11,000,000, serves four major airlines—Northwest, United, Pan American and Western. It contains federal installations, including weather station, post office, Civil Aeronautics Administration regional control office, and offices of the United States Immigration Service, Customs Service, Public Health Service and Department of Agriculture. Its field has three runways, respectively 7,500, 5,600, and 5,093 feet in length.

Education.—The University of Washington (established in Seattle in 1854) is one of the nation's larger educational institutions. Its 600-acre campus overlooks Lake Washington and Lake Union, with magnificent views of the Cascade Range and Mount Rainier. It enrolls about 15,000 students and has about 1,000 full-time professors and instructors. Included in the university are 50 schools and colleges. Its attractive buildings are valued at $50,000,000, of which some $25,000,000 has been expended since World War II. This includes the new Medical-Dental Center, costing $10,000,000, and a new engineering building and student union. Its stadium seats 55,000, and the Hec Edmundson Athletic Pavilion seats 13,000. A new crew house, completed in 1950, houses 24 shells and furnishes facilities for Washington crews which have set national and international records.

Seattle had 75 grade and special public schools, 7 junior high schools and three more under construction, 8 high schools, and 1 vocational school in 1950. Since the University of Washington is located within the city limits it is possible for a Seattle student to advance from kindergarten to his doctorate without leaving the city. The average public school attendance is 58,000; there were 2,190 teachers in 1950, and the annual expenditure per pupil is $215.24. The city has a number of private, parochial and cultural schools. Seattle University, a Catholic institution, has an enrollment of some 2,500 students. Seattle Pacific College, Protestant, has an enrollment of more than 1,000 students and a campus of eight acres, with 10 main buildings. Other schools include Cornish School of Music, Dance, Art, Drama; St. Nicholas, Helen Bush, Forest Ridge Convent and Holy Names Convent (schools for girls); and St. Joseph's and Lakeside (schools for boys).

Libraries.—The Seattle Public Library system consists of the central Carnegie library and 12 branches, including the municipal reference library, 1 mobile branch, and 13 stations. The collection contained (1950) about 768,536 volumes, 5,128 talking books for the blind, 3,470 phonograph records, and 4,156 pieces of sheet music. Circulation is over 2,600,000 volumes a year.

Press and Radio.—Seattle has one morning and one evening daily newspaper, with circulations of 269,000 and 238,000 respectively, for Sunday editions; a twice-weekly shopping news distributed to all residences in the metropolitan area (circulation, 135,000); numerous publications of special groups; several foreign-language papers; and a number of community papers. It has eight radio broadcasting stations, four of which are outlets for national networks, and one television station.

Parks and Recreation Centers.—The system of parks, boulevards and playfields in Seattle is unusually complete for the size and age of the city. It is operated by a board of park commissioners of 5 members, appointed by the mayor for a term of five years. It has control of approximately 3,000 acres of park properties, including 55 playgrounds, 9 field houses, 45 parks, 25 miles of boulevards, three 18-hole and one 9-hole golf courses, zoological gardens, an art museum, one warm-water swimming pool, 10 bathing beaches, two camps, and an arboretum of approximately 267 acres maintained by the University. Major park areas are Seward Park, 207.64 acres; Woodland Park, 188 acres, containing a modern zoo; Volunteer Park, 45 acres, containing the Conservatory and Seattle Art Museum; and Lincoln Park, 130 acres. Chief view parks are Kinnear, Kerry, Belvedere, Dwamish Head and Magnolia. Connecting the thickly forested parks in various parts of the city by winding drives with easy gradients, now skirting the Lake Washington shore or overlooking the waters of Puget Sound and the mountains, the scenic boulevard system within the city is one of the most attractive in the United States. Connecting with the Lake Washington Boulevard is a continuous drive of 52 miles around Lake Washington, with ever-changing vistas and views of charming suburban residential districts.

Charitable and Correctional Institutions.—Public support of charitable and character-building institutions is provided through a community fund which investigates the needs of member institutions, and assigns to each a definite sum for its annual operation. The total of

these requirements is then given by the public in an annual fund-raising effort. A public appeals board passes upon the merit of other campaigns or solicitations for contributions from the public.

Seattle has a number of hospitals, including the Seattle General, Providence, Saint Luke's, Maynard, Swedish, Virginia Mason, Columbus and Children's Orthopedic. King County maintains Harborview Hospital at 9th Avenue and Jefferson Street, and the federal government maintains the United States Marine Hospital at 14th Avenue South and Judkins Street.

Societies for Civic Betterment.—The Seattle Chamber of Commerce, with a membership of 4,000 businessmen, is the clearinghouse for many of the city's commercial, industrial and civic problems. Departments include those interested in Alaska, state development, foreign trade, transportation, retail trade, publicity, tourist promotion, military and aviation affairs, taxation, legislation, etc. The Seattle Junior Chamber of Commerce is also an active organization. Other semipublic organizations include the Manufacturers' Association, the Merchants Exchange, Seattle Clearing House and numerous trade groups and labor unions, together with technical groups and local improvement clubs. Service clubs are well represented. The leading social clubs include the Rainier, Arctic, Washington Athletic, and College clubs for men, and Sunset and Women's College clubs for women. Musical organizations include the Seattle Symphony Orchestra, Seattle Civic Opera, and Ralston Club. The Music and Art Foundation has a membership of 2,000 women in 32 units, which promote cultural activities. In addition, there are various groups which stage musical and dramatic performances throughout the year. Grouped around the University of Washington are several "little theaters," including the unique Showboat, Repertory, and Penthouse theaters.

Pageants, Celebrations and Conventions.—Direction and coordination of Seattle's pageants and celebrations are carried on by Greater Seattle, Inc., a community organization supported by public contributions and memberships. Created primarily for the promotion of Seattle's centennial celebration (1951–1952), it stages annually in August the Seattle Sea-fair, a gigantic carnival of water sports, including water skiing, crew regattas, and speedboat and yacht racing, replete with pageantry. Water events are of special interest, since Seattle has more small boats registered than any other city of the United States except New York, and has accessible 25,000 miles of inland waterways. Because of Seattle's scenic attractions and many opportunities for sports and recreation, it entertains many international, national and regional conventions. Hotel accommodations are available for as many as 10,000 delegates. The Civic Auditorium provides seating and committee rooms for about 7,500 delegates.

Tourist Travel.—The wide variety of tourist attractions, both within Seattle and easily accessible from the city, brings throngs of visitors, making the tourist trade an important source of income. Important tourist attractions within the city include: Lake Washington Floating Bridge; Volunteer Park with Seattle Art Museum, Conservatory, and formal gardens; waterfront with varied attractions, including Ye Old Curiosity Shop, where curios from all over the world may be purchased, and the Aquarium, with its displays of salt-water plant and animal life; United States government locks, second largest in the world; University of Washington campus, with museums and landscaping; view from 42-story Smith Tower; Lake Washington Boulevard drive, with University of Washington Arboretum and Seward Park; Woodland Park and Zoological Gardens; view of harbor from Marine Drive; and public markets.

History.—On Nov. 13, 1851, the first settlers landed from the schooner *Exact* at a point within the present limits of Seattle, which they named New York, and to which was added the Indian word *Alki,* meaning "by and by." Less than two months earlier, Capt. Robert C. Fay, John N. Low, David Denny, and Leander Terry had arrived by boat in Elliott Bay, and the latter two had remained to build a cabin on the south headland of the bay. On Feb. 15, 1852, claims were located on the east shore of Elliott Bay, including the site of present-day Seattle's business district. The village was named for Seathl, a friendly Indian chief of the Dwamish and Suquamish tribes; and on May 23, 1853, a chart of the "Town of Seattle" was recorded with the Territory of Olympia. Its first church was organized by the Rev. David E. Blaine in October 1853, and the first school was opened in the following year.

In January 1856 the town (population 300) withstood an Indian uprising which was quickly quelled with the aid of the guns of the sloop-of-war *Decatur.* The discovery of gold two years later on the Fraser River to the north in Canada resulted in a stampede of prospectors through Seattle, but only a few remained to settle there. In 1861 the Territorial University (now the University of Washington) was located in Seattle after persistent lobbying by the town's citizens in the territorial legislature. Its first wooden structure was built on a tract of land donated and cleared by the townspeople, and its only instructor, Asa Mercer, personally canvassed the Puget Sound region in search of the first students. In 1863 the first issue (four pages) of the weekly Seattle *Gazette* (which later became the *Post-Intelligencer*) was produced by J. R. Watson, and the town's first hospital was opened. Telegraph lines reached there in 1864, and in 1866 the first of two groups of young women from good families—the "Mercer girls"—were persuaded by Asa Mercer to come from the Atlantic coast to find husbands among the male population. Seattle was incorporated as a town in 1865 and reincorporated as a city in 1869. Regular steamship service with San Francisco was inaugurated in 1875, and in 1883 the first major railroad reached Seattle after the entire citizenship had wielded pick and shovel to build a line threatening to connect with the Canadian Pacific.

Riots against Chinese laborers imported to work on the railway and in the mines nearby brought a period of violence to the growing community in the 1880's, but these were quelled by local vigilance committees in 1885. Cable cars and electric lights both made their appearance in 1888. Then, in June 1889, the young city was practically wiped out by the great fire which destroyed 60 blocks of business and residential districts with an estimated loss of $15,000,000. Soon, however, new, more permanent structures were built over the ashes of the fire, and the modern city began to take form. In 1893 the Great Northern Railway made Seattle its western ter-

minus, connecting with a line of giant ocean liners. Discovery of gold in the Klondike, with the much publicized arrival, on June 17, 1897, of the steamer *Portland* with a "ton of gold" (about $800,000 worth) brought a new era to Seattle. During the next decade her population almost trebled as the city's boundaries were extended to include the West Seattle, Ballard, and Columbia City districts in 1907, and Georgetown in 1910. In 1909 the city held its world's fair, the Alaska-Yukon-Pacific Exposition, which attracted an estimated 3,750,000 visitors with a resultant further growth in population.

The coming of other railway lines, the opening of the Panama Canal which provided a short water route to the Atlantic coast and Europe, the inauguration of transpacific steamer service, the development of the state's natural resources, and the harnessing of vast hydroelectric power all added to the wealth and growth of the city. During World War I, Seattle led the nation in shipbuilding and marked industrial growth; its port was second only to New York in volume of shipping. During the years between the world wars, Seattle made substantial gains in many lines despite the effects of the financial crash of 1929 and a period of labor strife in the 1930's. World War II brought a tremendous upsurge in her war industries—shipbuilding, airplane construction, and production of many war materials. As a port of embarkation, vast numbers of men and quantities of material moved across her waterfront and crowded her port facilities. The rapid increase in population and industrial activity did not halt with the conclusion of hostilities, however, but continued after the turn of the half-century.

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HAROLD OTHO STONE.

SEAWEEDS, the simpler kinds of plants which grow in the water. The term is restricted to the lower plants, and does not include the aquatic kinds of mosses, liverworts, fernworts, and flowering plants (see ALGAE). Originally the term was applied exclusively to the plants which live in the seas and oceans, but these are now called "marine seaweeds" to distinguish them from the "fresh-water seaweeds" which grow in rivers, lakes, and ponds. The simplest of all plants, the blue-green slimes (*Cyanophyceae*) are the lowest of the seaweeds. They occur mostly in fresh waters; some, however, are marine. The green seaweeds (*Chlorophyceae*) are of considerably higher organization, the cells being distinctly nucleolated and possessing well defined chromatophores in which the green coloring matter resides. They include such single-celled types as the common green slimes (*Protococcus*), desmids, diatoms, the filamentous pondscums, green felts (*Vaucheria*), as well as some larger leaf-like and massive kinds (*Ulva, Caulerpa, Codium,* etc.). They occur abundantly in both fresh and salt waters throughout the world.

The brown seaweeds (*Phaeophyceae*) are closely related to the green seaweeds, and differ from them mainly in having an additional brown coloring matter which hides the green color of the chromatophores. The simplest forms are minute few-celled plants; others are branching filaments; while still others are large, massive plants many feet in length, and composed of root, stem and leaves. In all forms the mode of reproduction is of a simple type, showing their low grade in spite of the great size of some of the species. Among the larger plants of this group are the kelps (*Macrocystis, Lessonia,* etc.), devil's aprons (*Laminaria*) and rockweeds (*Fucus*). Some Pacific species of the first-named genus attain a length of several hundred feet, and are probably the longest plants in the world. Nearly all brown seaweeds are marine, a few only living in fresh waters. The red seaweeds (*Rhodophyceae*) are by far the most beautiful and interesting of aquatic plants. They are of a higher organization than those of the preceding groups. A few are composed of simple slender filaments, but they are more commonly multicellular stems, with roots below, and leaf-like or finely divided branches above. Although they are green plants, having well-developed chromatophores in their cells, they have in addition a reddish or purplish coloring matter which hides the green color. This often gives them a beautiful color which, added to their delicate and regular branches, makes them exceedingly attractive objects of study. They are commonly collected by seaside visitors, under the name of "seamosses." A few species live in fresh waters, all the others being marine. Some species are edible, as notably the so-called "Irish moss" (*Chondrus crispus*), of the Atlantic coast of America and Europe, from which is made the delicacy known as *blanc mange.* The highest of the seaweeds are the stoneworts (*Characeae*), which resemble some of the red seaweeds, but are of a green color, the red coloring matter not being developed in them.

SEAWELL, sē'wĕl, **Molly Elliot,** American novelist and playwright: b. Gloucester County, Va., about 1868; d. Washington, D.C., Nov. 15, 1916. After the death of her father, a nephew of President Tyler, Miss Seawell and her mother removed to Washington, D.C., where she began writing stories and sketches in 1886. Her first signed story was *Maid Marian,* which was subsequently dramatized. The next offering of Miss Seawell was *Throckmorton* (1890). It met with success as did *Children of Destiny,* which followed it in 1893. A prize of $500 offered by the *Youth's Companion* for a study of boys presented a new field for conquest. She won the prize over 3,000 competitors with *Little Jarvis.* So great was the popularity of the story that it was made the first of a series entitled *Young Heroes of Our Navy.* The succeeding volumes—*Decatur and Somers, Midshipman Paulding,* and *Paul Jones* were written by Miss Seawell, and maintained the success won by the first. In 1895 her *Sprightly Romance of Marsac* won a prize of $3,000 offered by the New York *Herald* for the best novelette. In 1900 she dramatized the story. In 1908 she won another *Herald* prize for a short story with *John Mainwaring, Financier.* Miss Seawell's other stories include *Twelve Naval Captains; The Rock of the Lion; The Imprisoned Midshipman; The Lost Duchess of Belgrade; The Secret of Toni; The House of Egremont; Papa Bouchard; Garvin Hamilton; A*

Strange, Sad Comedy'; 'The Victory'; 'The Chateau of Monplaisir'; 'The Marriage of Theodora'; 'A Virginia Cavalier'; 'The Jugglers'; 'The Lover of the Lady Arabella'; 'History of the Lady Betty Stair'; 'Francezka'; 'Fifi'; 'The Ladies' Battle,' and 'The Diary of a Beauty.' Miss Seawell was identified prominently with the anti-suffragist movement in Washington.

SEBACEOUS GLANDS, small structures of glandular nature and sacculated form which exist in the substance of the corium, or deep layer of the dermis or true skin. They are very generally distributed over the entire skin-surface, but are most numerous in the face and scalp. Those of the nose are of large size, and may frequently become enlarged from the accumulated secretion of the glands; while the largest in the body are the sebaceous glands of the eyelids, the Meibomian glands (see Eye). Around the orifices of the mouth and anus, nose and external ear, these glands are found in numerous array; but they appear to be absent from the skin of the palms of the hands and soles of the feet. Each sebaceous gland consists essentially of a lobulated or sac-like structure opening by a single efferent duct. The wall of the sac, as well as that of the duct, is lined by cells of cubical epithelium. These cells secrete the sebaceous matter which is chiefly fat, which collects in the gland, the cells becoming transformed into the secretion and breaking down in the process. The separate sacculi, or little pouch-like divisions which make up each gland, may vary in number from 2 or 5 to 20. As a general rule the ducts of the sebaceous glands open into the hair-follicles, or sac-like involutions of the skin which surround and enclose the roots of hairs. But in many cases the ducts open simply on the external surface of the skin. There are generally two sebaceous glands in connection with each hair. A curious little parasitic mite, harmless in its nature — the *Demodex folliculorum* — is frequently found inhabiting the sebaceous ducts of the nose, especially when their secretion is pent up. This little organism is not known to occur elsewhere.

The sebaceous glands are first developed in the sixth month of embryonic life, and appear in their earliest condition as sac-like appendages to the hair-follicles. The secreting cells, containing fat particles, appear in the centre of the developing gland; these cells gradually enlarge and, escaping by the root or attached portion of the sac, constitute the first secretion of the gland. The functions of the sebaceous secretion are chiefly those of keeping the skin moist and from being cracked by the influence of heat and of the air. Friction between skin surfaces is also diminished in the same manner by the sebaceous secretion. The secretion is present in greatest amount in those races which inhabit warm climates and are greatly exposed to the sun's heat. Pimples and boils are the most frequent types of inflammation of the sebaceous glands. See Hair; Skin.

SEBAGO (sĕ-bā'gō) **SALMON,** the land-locked salmon of Sebago Lake, Maine, and a few neighboring inland waters, which has lately been widely distributed through fish-cultural operations. It was long regarded as a mere land-locked variety of the Atlantic salmon, but Jordan and Evermann consider it entitled to rank as a species (*Salmo sebago*) distinct from that and from the Ouananiche (q.v.). In Sebago Lake it averages about 10 pounds in weight. Its habits are like those of the typical species with such modifications as the physical differences between the ocean and lake make necessary. «In Sebago Lake in the fall, structural and chromatic changes occur, and it ascends tributary streams to spawn. After this function is performed it returns to the lake, which is its ocean, and resorts to deep water. In the spring as soon as the ice breaks up, when smelts, upon which it extensively feeds, are running up the streams to spawn, the salmon follow them.» Consult Jordan and Evermann, 'Food and Game Fishes' (New York 1903), and American angling authorities generally.

SEBASTIAN, sĕ-băs'tĭ-ạn, **Saint,** a saint of the Roman Catholic calendar: b. Narbonne, Gaul, toward the middle of the 3d century; d. Rome, 20 Jan. 288. His position as captain in the Prætorian Guard at Rome gave him many opportunities of spreading Christianity, and protecting its adherents; but he was finally arrested and carried before Diocletian. The emperor ordered him to be shot to death by archers. A Christian woman named Irene, finding him still alive, drew out the arrows, took him home, and nursed him till he recovered. He then presented himself before Diocletian, and remonstrated with him for his cruelty; whereupon the emperor ordered him to be beaten to death, and his body to be thrown into the common sewer, whence it was taken by another Christian woman, called Lucina, who buried it at the feet of the apostles, Peter and Paul. In the 9th century his relics were carried to Soissons, whence they were dispersed through France, Spain, Germany and the Netherlands. A church was erected to this saint by Pope Damasus. Saint Sebastian is invoked against the plague, and is considered the patron saint of marksmen. His day is the 20th of January. There are many pictures of this saint by the Italian and other painters. He is generally represented as a beautiful youth tied to a tree and transfixed by arrows. The most famous pictures of his martyrdom are those by Luini, Bassi, Mantegna, Holbein, Paul Veronese and Ribera. In the cathedral at Lucca the subject has been treated in sculpture by M. Civitali.

SEBASTIAN, Dom, king of Portugal: b. 1554, d. 1578. He was the posthumous son of the Infant John by Joanna, daughter of Charles V, and ascended the throne in 1557, at the death of his grandfather, John III. During his minority the government was conducted by his great uncle, Cardinal Henry, brother of Emanuel the Great. He was educated by his guardian, Catharine of Austria, wife of John III (sister of Charles V). He was imbued with religious enthusiasm and a chivalrous desire to undertake a crusade. His constant dream was the conversion of Asia and Africa to Christianity, and the subjection of these continents to Portugal. At 20 he made an expedition to Ceuta, Tangier and Magazar, the only possessions that remained to the Portuguese from former conquests in Africa. From these places he suddenly fell upon the unsuspecting inhabitants and although no material results ensued, his lust for conquest became more con-

firmed. Soon afterward (1578) a war of succession broke out in the kingdom of Fez and Morocco. Mulei Malek, the youngest son of the last emir, had, contrary to his father's will, been excluded from the throne, but with foreign aid had finally succeeded in conquering his hereditary kingdom, and compelling his nephew, Mulei Mohammed, who had usurped it, to flee. The latter sought aid from Sebastian, who yielded to the request, hoping to effect something for Christianity and the fame of Portugal. In spite of the admonitions of his counselors, he equipped a fleet and an army, part of which he had collected in Spain, Germany and Italy, and sailed for Africa, 24 June 1578. The expedition reached Tangier in safety, but at Alcazarquivir was met by the far more numerous host of Mulei. Here on 4 Aug. 1578, a decisive battle was fought, in which Sebastian was completely defeated. Almost all his followers, including the best of his nobility, were either slain or taken prisoners, and he himself was among the missing. A corpse supposed to be the king's was found, but it was disfigured with so many wounds that identification was impossible. His death in consequence remained doubtful and gave occasion to the rise of several pretenders, the most notable of whom appeared in Venice 20 years afterward, and, after various vicissitudes, succeeded in arousing the sympathy of all Europe. Faith in his pretensions eventually subsided and he lapsed into obscurity. Consult D'Antas, Miguel, 'Les faux Don Sebastien' (1865).

SEBASTIANO DEL PIOMBO, sā-bäs-tē-ä'nō dĕl pē-ŏm'bō. See PIOMBO, SEBASTIANO DEL.

SEBASTOPOL, sē-băs'tō-pōl or sĕb-ăs-tō'-pōl, or **SEVASTOPOL** (Russ. sā-väs-tō'pol), an important seaport in the southeast portion of the autonomous Soviet Republic of Crimea, on a harbor famed for its excellence — an inlet of the Black Sea, four and one-half miles long, one-half mile wide at the mouth and one mile wide further inland, afterward averaging one-half mile across. Depth from three to 11 fathoms. It is enclosed by high limestone ridges, and is accessible to the largest ships. The river Tchernaya enters the harbor at the east. The principal part of the town occupies a slope between South Bay or Dockyard Harbor, and Quarantine Bay. Prior to the destruction of the town (1854–55) it was solidly built; the forts were marvelous strongholds mounted by 700 guns and the docks were among its most important works. The dock basin was supplied with water by a canal from the Tchernaya. The town was almost unprotected on the interior side, however, but the temporary defenses erected by General Todleben, during the Crimean War (the most formidable of which were the works of Malakoff and Redan) have since that time become celebrated. These works were, however, at last captured, at the end of a memorable siege by the allied French and English forces, the Russians retiring after the town had been ruined. The French and English engineers then blew up the docks and forts, which, by the Paris treaty (1856), were not to be rebuilt. These restrictions were annulled in 1871 by the London conference. The docks and forts were restored by the Russian government in 1885, and Sebastopol is now again the naval port for the Black Sea fleet. The town was bombarded by the Turks in the great European War. The town has been partially rebuilt — it was once an important commercial port, but Kaffa (q.v.) has taken its place since 1899, in this regard. The value of imports entering this port was formerly over $5,000,000; of exports, $15,000,000. Sebastopol was founded on the site of Akhtiar in 1783, by Catharine II. Many historical reminiscences render this an interesting spot. The promontory where the town now stands was once occupied by the temple where Iphigenia, daughter of Agamemnon, officiated as priestess. Later, Greeks colonized the promontory, but were overcome by the Genoese, who established themselves at Balaclava. The ruins of the Genoese castles are still to be seen. Pop. about 77,000.

SEBILLOT, sā-bē-yō, **Paul,** French folklorist: b. Matignon, France, 6 Feb. 1846. He was educated at the communal college of Dinan, studied law at Rennes, and established himself in Paris as a notary, but soon abandoned the law for art. From 1870–83 he exhibited about 20 pictures at the Salon, but his travels through Saint-Brieuc, Pont-Aven, and various out-of-the-way sections of Brittany aroused an interest in folklore, and he gradually drifted from art to the study of folklore, on which he wrote a series of excellent books. He succeeded to Henri Martin's seat in the commission for Megalithic Monuments, became *chef du cabinet* at the ministry of public works, and in 1889 chevalier of the Legion of Honor. From its foundation in 1885 he was editor of the *Revues des traditions populaires.* His works include 'Contes populaires de la Haute-Bretagne' (3 series, 1880–81–82); 'Légendes, croyances, et superstitions de la mer' (2 vols., 1886–87); 'Litterature orale de l'Auvergne' (1898); 'Le folklore des pechêurs' (1901); 'La mer fleurio le rivage Marius et corsaires' (1903); 'Le folklore de France' (1904–07); 'Le folklore, litterature orale et ethnographie traditionelle' (1913). He died in 1918.

SEBORUCCO, a narrow bench of coral rock margining a large part of the coast of Cuba. It is mostly a few yards wide and elevated about 15 feet above the sea. It is due to fringing coral reef raised by a general uplift of the island.

SECALE, *in botany,* rye, a genus of the *Triandria Digynia* class and order, in the natural order of *Gramineae* or grasses. Essential character, calyx opposite, two-valved, two-flowered, solitary. There are four species; the villosum, orientale, creticum and cereale. Secale villosum or wood-rye grass is distinguished by a calyx with wedge-shaped scales, and by the fringe of the glume being woolly. The glumes of the secale orientale are shaggy and the scales of the calyx are shaped like an awl. The glumes of the secale creticum are fringed on the outside. The secale cereale or common rye has glumes with rough fringes. There are two varieties, winter and spring rye. The winter rye, which is larger in the grain than the spring rye, is sown in the autumn, at the same time with wheat, and sometimes mixed with it; but as the rye ripens sooner than the wheat, this method is exceptionable. The spring rye is sown along with oats, and usually ripens as soon as the

winter rye; but the grain produced is lighter and it is therefore seldom sown. See RYE.

SECAUCUS, town, New Jersey, in Hudson County; altitude 41 feet; 3 miles northwest of Jersey City; on the Erie and Lackawanna railroads. There is truck farming in the surrounding area. The city's manufactures include clothing, silk, metal products, cleansers, and fertilizers.

The town was incorporated in 1917 and the government is administered by a mayor and council. Pop. (1950) 9,750.

SECCHI, sĕk'kē, **Angelo**, Italian astronomer: b. Reggio, Emilia, June 18, 1818; d. Rome, Feb. 26, 1878. He entered the order of the Jesuits in 1833, and after teaching in various Jesuit colleges, including Georgetown University, Washington, D.C., he was in 1849 appointed professor of astronomy and director of the observatory at the Collegio Romano. When the Jesuits were expelled from Italy in 1870 he was permitted to retain his position. Father Secchi made a careful study of the physical constitution of the sun, the nature of sun-spots, and the solar prominences, but of much greater importance was his pioneer work, carried out with less perfect instruments, contemporaneously with that of Huggins in stellar spectroscopy or astrophysics. He made the first systematic spectroscopic survey of the heavens and proposed a classification of stellar spectra under four main types, which has proved a valuable basis for subsequent research. Among his works are *Catalogo delle Stelle di cui si è determinato lo Spettro luminoso* (1867); *L'Unità delle Forze fisiche* (1869); *Le Soleil* (1870); *Le Stelle* (1877).

SECESSION, the act of withdrawing from, a term of great political importance, especially in the history of the United States. Whenever a state has claimed the right to withdraw from the Union, it has based its claim on the doctrine of state sovereignty. This claim must be considered as emphatically distinct from the right of revolution, insurrection or violent revolts, in all of which there is no claim technically of legal right, and the appeal of which is to force instead of reason. Nearly every state of the Union, in its turn, has advanced the right of secession and usually each has ben condemned by the others as treasonable. This claim was specifically brought forward or involved in the "Kentucky Resolutions," the "Hartford Convention" (qq.v.) and the "Nullification Ordinance." The election of Abraham Lincoln to the presidency of the United States in 1860, when the political situation was flanked with sectional differences resting on state claims, was all that was necessary to change the theory of secession in the South into an attempt to effect the reality. South Carolina took the lead. No single state was prepared or willing to secede alone, but Florida, Mississippi, and Alabama agreed to secede with any other state. Again South Carolina was leader in calling a state convention, and on Dec. 20, 1860 the Act of 1788, ratifying the national Constitution, was repealed, and it was declared "that the union now subsisting between South Carolina and other States, under the name of the United States of America, is hereby dissolved." A declaration of the causes for this act was formulated and was adopted on the 24th. The governor proclaimed "the secession of South Carolina" the same day. Mississippi was the first to follow this example, on Jan. 9. 1861; then in succession came Florida, on January 10; Alabama, January 11; Georgia, January 19; Louisiana, January 26; and Texas, February 1, though in the case of this last state the proceedings were irregular. Virginia followed in April; Arkansas and North Carolina in May and Tennessee in June. The Civil War was the consequence; its final issue was the victory of the Union government in 1865 and the reincorporation of the seceding states in the United States. See also SECESSION IN THE UNITED STATES; UNITED STATES—*Causes of the Civil War; Secession.*

SECESSION CHURCH, in Scottish ecclesiastical history, a religious body which withdrew from the Established Church of Scotland in 1733, when several preachers were ejected in consequence of their opposition to the law of patronage. The ejected ministers formed themselves into an ecclesiastical court, under the name of the "Associated Presbytery," and published an act, declaration and testimony to the doctrine, worship, government and discipline of the Church of Scotland. In 1747 a division arose among the seceders respecting the legality of the burgess oath, in which burgesses profess "the true religion professed within the realm." Those who asserted the lawfulness of the oath were called burghers, those who condemned it anti-burghers. In 1820 they were reunited as "The Associated Synod of the Secession Church," several congregations of each party, however, refusing to accede to it. In 1847 the Associated Synod, joining with the Relief, constituted the United Presbyterian Church. See PRESBYTERIANISM; SCOTLAND.

SECESSION IN THE UNITED STATES. To properly understand the causes which led to the secession of the Southern States in 1861 and the reasons which actuated those by whom such action was advocated, we must confine our investigations to the history of the country and the conditions which existed prior to the dates when the seceding states withdrew from the Union. If we look back from the standpoint of today, we see but little of the picture which was presented at that period. We must study the theory of the Constitution as understood and explained by its creators, and the history of the period prior to 1861, at least so far as it relates to constitutional rights and construction. It will also be interesting to consider the views entertained by advocates of the states' rights doctrine as distinguished from the views of the extreme nationalists, and we must also become informed regarding the long-continued struggle between the leaders of these two parties. In 1860 not only the leaders but the Southern people generally were firm in the belief that a state had the legal right to secede from the federal Union. This was the natural result of the teachings of more than half a century. Whatever opposition existed in the several state conventions or among the people of the seceding states arose not on the question of the principle of secession, the right to secede, but upon the expediency of seceding. Perhaps the most conspicuous example of the unity of the people of the seceding states is to be found in the proceedings of the Alabama Convention. A very large minority of this convention, for a while supposed to be a majority, was elected on the following platform: "That we hold it

to be our duty, *first,* to use all honorable exertions to *secure* our rights *in* the Union, and if we should fail in this, we *will maintain* our rights *out of the Union;* for, as citizens of Alabama, we owe our allegiance first to the State; and we will support her in whatever course she may adopt."

With rare exceptions the arguments against such action were on the ground that it was inexpedient and inadvisable, but when the act was consummated it was generally recognized in the seceded States as the supreme law of the land, the exceptions being for the most part confined to a few counties in East Tennessee and the sparsely inhabited strip of mountain land known as the southwestern part of the Alleghanies. In this connection it is important to state that in 1861 and for years prior to that time this belief in the right of secession was by no means confined to the South, or to the so-called pro-slavery party. Horace Greeley, editor of the New York *Tribune,* was outspoken in upholding the right of secession, and for months after the establishment of the Confederate government army officers from the South openly discussed the question of remaining in the Union army or joining the Confederacy, and those who decided upon the latter course were allowed to go freely.

General Joseph E. Johnston and Col. Robert E. Lee both continued in the performance of their army duties in Washington for nearly two months after the inauguration of President Lincoln, the former holding the all-important position of quartermaster-general of the army of the United States; and it was after it was generally known that Colonel, afterward General, Lee had decided that it was his duty to give his fealty to his native State, Virginia, that Mr. Lincoln offered him the appointment as commander-in-chief of all the armies of the United States. At that time the authorities in Washington did not use the words treason and traitors in referring to the Southern officers who resigned their commissions and joined the Confederate army. But the results of the appeal to arms whereby the advocates of secession were overwhelmed have clouded and caused to be utterly forgotten the legal and logical principles for which the States Rights party had contended for three-quarters of a century.

Greeley said in 1860: "War is a hideous necessity at best, and a civil conflict, a war of estranged and embittered fellow countrymen, is the most hideous of all wars." (New York *Tribune,* 16 Nov. 1860). And his words were prophetic. In the terrible internecine war of four years more than 1,000,000 human beings, most of whom were the youth of the land, fell in battle or succumbed to disease and the hardships of campaign, or were wounded and maimed; while in nearly every home, North and South, heartbroken mourners were crushed by the awful sacrifice to the God of Battles. During and at the close of the war every branch of the government was under the control of those responsible for the coercive policy which brought it on. With rare exceptions the whole press of the Northern States and its literature were dominated by the same influences. The chief executive and all his subordinates in the government with one acclaim pronounced the edict that those who had not supported their views should be made odious to the American people, and from that time the teaching to the youth of the land has been of this character. The causes which influenced the action of those who brought about the secession of the Southern States became utterly obscured and forgotten.

Causes of Secession.— The general assumption that slavery was the sole cause of secession and the war that followed is very far from correct. It is clearly to be seen that far away and beyond the question of slavery, even in the very earliest days of the life of the nation, the two parties began the struggle — the one to maintain the unrelinquished rights of the States, the other to establish and vest greater power in the central government. But although this leading question, and other cognate questions were really at issue in this conflict, slavery was the proximate occasion of the Civil War. The anti-slavery agitation focused and brought into active operation the theories of the extreme nationalists that the central government had the right to go into the domain of State governments and regulate their domestic affairs. And the threats of the abolitionists awoke the Southern people to the realization that the guarantees of the Constitution for the protection of slave property were to be nullified and, at least to that extent, the rights of the States destroyed. It is, therefore, necessary to review the history of this contributing, if not paramount, cause, without entering upon any discussion of the question of slavery itself.

History of Slavery.— Slavery was not only a heritage from the mother country, but the history of early colonial times shows that it was a forced heritage that was resisted and opposed by the colonies. In the same spirit the Southern people opposed slavery at the time of the Declaration of Independence and were vigorous in resisting the further importation of slaves from Africa. The wise men of that day foresaw the evils attending such a traffic. Its enormous profits would cause a further great influx of people hardly removed from savagery. But when slavery became a fixed institution, recognized, guaranteed and protected by the Constitution, the people of the South sought to ameliorate, so far as possible, all the evils attending it. Slavery was part of the common law of England prior to the settlement of the first colonies in America, and became the common law of the colonies; and at the time of the Declaration of Independence existed in each of the 13 colonies. As above stated, this condition existed despite the efforts of some of the colonies to terminate it. Judge Cooley in his continuation of Story's 'Commentaries on the Constitution,' says: "No colony was so persistent in its efforts to check the [slave] trade as Virginia, and Judge Tucker enumerates 23 acts on the subject, beginning with 1699." Georgia, under Oglethorpe, prohibited the importation of slaves until 1752, when the proprietors surrendered the charter and the colony became part of the royal government, when the power of the colonists to prevent the importation of slaves ceased, the Crown prohibiting the exercise of any such power by the colonists. In 1760 South Carolina passed an act prohibiting the further importation of African slaves. The act was rejected by the Crown; the governor was reprimanded; and a circular was sent to all the governors of the

colonies warning them against presuming to countenance such legislation.

England not only considered the slave trade beneficial, and fostered and protected it, but had actually inaugurated and established it. Its first appearance in history is in the grant of a charter by Queen Elizabeth to a company formed to supply African slaves to the Spanish-American colonies — the queen herself being a shareholder in the company. In 9th and 10th William III an act was passed reciting that «the trade was highly beneficial and advantageous to the kingdom.» In 1708 the House of Commons resolved: «That the trade was important, and ought to be free and open to all the queen's subjects trading from Great Britain.» And as late as 1775 the Earl of Dartmouth, in answer to a remonstrance from the agent of the colonies, said: «We cannot allow the colonies to check or discourage in any degree a traffic so beneficial to the nation.» And so popular was this traffic that slaves were openly sold in the public squares of London. Thus were the efforts of the colonies, led by Virginia, Georgia, Maryland and South Carolina, to put an end to the traffic, thwarted by the greed of the traders in the mother country.

The first African slaves imported into America were landed by a Dutch trading vessel at Jamestown in 1620, and from that time the traffic became general throughout all the colonies Pecuniary profit to the traders and the need of the negro as a laborer was not the only incentive to this traffic. The press and even the pulpit contended that it was humane and Christian to bring these heathen savage negroes to the protective care of civilized people. Slaves were imported in large numbers into New England until it became apparent that they were not fitted to the rigorous climate of the North. Importation to the northern colonies and States gradually diminished and finally ceased, but New England shipowners continued for many years to be actively engaged in the business of importing and selling slaves. Notwithstanding the reasons in favor of this business the leaders of thought among the Southern colonists continued to fight against the traffic, and Jefferson, in his first draft of the Declaration of Independence, brought forth, as one of the counts in his indictment of the king, «this cruel war against human nature itself . . . this piratical warfare,» and charged that the king had «prostituted his negative for suppressing every legislative attempt to prohibit or to restrain this execrable commerce» in order to keep open a market for the sale of human beings. Jefferson gave, among other reasons for omitting this clause from the final draft of the Declaration: «Our Northern brethren also, I believe, felt a little tender under those censures; for, although their people had very few slaves, yet they had been pretty considerable carriers of them to others.» This traffic against which the colonies had waged war for a century continued to exist at the time of the Declaration of Independence; and when the Constitution was adopted slavery existed in every colony with the possible exception of Massachusetts, where in 1781, not by legislative enactment, but by a decision of the Supreme Court of that colony, it was declared inconsistent with the declaration of the Bill of Rights that «all men are born free and equal.»

The framers of the Constitution (q.v.) realized the sensitive and delicate nature of the question of slavery, and wisely left it untouched except to protect the property rights of the slaveholders and to give to Congress the power to prohibit the importation of slaves after a certain date. The third paragraph of section 2 of Article IV of the Constitution provided that «no person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered upon claim of the party to whom such service or labor may be due.» Under this clause Congress passed the Fugitive Slave Law (q.v.) of 1793. The first paragraph of section 9 of Article I of the Constitution provided: «The migration or importation of such persons as any of the States now existing shall think proper to admit shall not be prohibited by Congress prior to the year one thousand eight hundred and eight, but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.»

The history of the adoption of this clause sheds much light upon the attitude of the Southern slaveholders. The first draft provided: «No tax or duty shall be laid, etc., on the migration or importation of such persons as the several States shall think proper to admit; nor shall such migration or importation be prohibited.» South Carolina and Georgia insisted that the freedom of importation should be limited, and insisted upon a limitation as a condition of the Union; and the clause limiting until 1808 the prohibition against Congress of preventing such importation was finally adopted.

During the period from 1787 to 1808 the question of prohibiting the importation of slaves was entirely under the control of the States, and every Southern State which had not already done so enacted laws prohibiting further importation of slaves. Jefferson's earnestness in opposing the traffic has already been noticed, and Virginia was the first State to prohibit it. Georgia was the first State to incorporate such a prohibition in the Constitution. Henry Laurens of South Carolina writing to his son, 14 Aug. 1776, said: «You know, my dear son, I abhor slavery. I was born in a country where slavery had been established by British kings and parliaments, as by the laws of that country, ages before my existence. . . . Not less than 20,000 pounds sterling, would all my negroes produce, if sold at public auction to-morrow. I am not the man who enslaved them; they are indebted to Englishmen for that favor; nevertheless I am advising means for manumitting many of them, and for cutting off the entail of slavery. . . . I perceive the work before me is great.»

Mr. Lowndes of South Carolina, speaking in the House of Representatives on 14 Feb. 1804, of the impossibility of prohibiting the importation of slaves into his State, said: «With navigable rivers running into the heart of it, it was impossible for us, with our means, to prevent our eastern brethren from introducing them (the negroes) into the country. The law was completely evaded.»

In 1807 Congress passed an act prohibiting the importation of slaves into any part of the United States after 1 Jan. 1808. The vote in

the House of Representatives was almost unanimous, being 113 against 5. Of the five who voted against it only three were from the South, one being from the Portsmouth district, New Hampshire, and one from Vermont. Mr. Betton from New Hampshire represented large shipping interests; and that the vote of Mr. Crittenden of Vermont was approved by the people of his State is shown by the fact that he was three times re-elected to Congress, and was subsequently elected governor and judge. This vote shows the absence of any sectional division of sentiment on the subject. In the meantime in 1784 Virginia had ceded to the United States the great Northwest Territory, and in 1787, before the adoption of the Constitution, the Congress had adopted the Ordinance for the Government of the Northwest Territory. This was adopted at the instance of Virginia, and its Sixth Article provided that "there shall be neither slavery nor involuntary servitude in the said Territory, otherwise than in punishment of crimes whereof the party shall have been duly convicted." In December 1805 the legislative council and house of representatives of the Indian Territory petitioned Congress to suspend the operation of the Sixth Article, and petitions of numerous inhabitants of the Territory, together with a letter of William Henry Harrison, governor of the Territory, of the same purport, were forwarded to Congress. These petitions were referred to a committee of seven members consisting of representatives from Virginia, Pennsylvania, Ohio, New York, Kentucky and South Carolina, who reported favorably to the petition, but no final action was taken by Congress. In January 1807 a letter from Governor Harrison enclosing resolutions unanimously adopted by the legislative council and house of representatives of Indiana, petitioning for the suspension of the Sixth Article and for the introduction of slavery, was laid before Congress. The matter was again referred to a committee whose members were drawn from various sections of the country. The committee again reported favorably, the House adopted a resolution suspending the article, but the Senate failed to concur in it and the matter was dropped.

Although the importation of slaves was prohibited the institution of slavery became more firmly intrenched in the slave-holding States, and at the same time a sentiment in favor of its abolition grew stronger in the non-slaveholding States. In 1819 a violent dispute arose between the North and South, the occasion being the proposal to admit Missouri as a State. After a year of bitter controversy a settlement was reached in a compromise whereby Missouri, with a constitution permitting slavery, was admitted, but as to the remaining portion of the territory of the United States lying north of lat. 36° 30′ N., it was provided that slavery should be prohibited. In the North the compromise was exceedingly unpopular, and a general movement looking toward the abolition of slavery was commenced. In 1840 and in 1844 the anti-slavery party had Presidential candidates in the field. The annexation of Texas, the war with Mexico and the further acquisition of territory furnished cause for additional controversy. In 1848 the anti-slavery party showed growing strength, and political campaigns took on increasing bitterness. The one side depended upon the guarantees of the Constitution to protect its property rights; the other insisted upon their right to prevent the extension of slavery, "while conceding," as Judge Cooley admits, "that the Federal government was powerless to disturb it in the States." During these times of fierce controversy the greatest minds from all sections of the country devoted their efforts to securing peace. Clay, Webster, Cass and Benton met in harmony and by their united efforts secured the compromise of 1850 by which California was admitted as a free State, new States were to be permitted to be carved out of Texas, the slave trade was prohibited in the District of Columbia and new Territories were to be organized without either expressly permitting or prohibiting slavery. But these compromises and all the efforts of the peacemakers were futile. The Missouri Compromise was repealed, the Fugitive Slave Law was nullified in the North, in Kansas armed conflicts occurred between the opposing factions, and in October 1859 John Brown with a band of Northerners made a raid into Virginia in an endeavor to incite the negroes of the South into insurrection, rapine and bloodshed.

The almost unanimous sentiment, North and South, upon the question of re-opening the African slave trade is shown by the vote on the following resolution introduced in the House of Representatives by Mr. Orr of South Carolina, on 15 Dec. 1856: "Resolved, That it is inexpedient, unwise and contrary to the settled policy of the United States, to repeal the laws prohibiting the African slave trade." This resolution was adopted by a vote of 183 to 8, and most of those voting against it explained their votes by stating that no proposition looking to the opening of the slave trade having been presented the resolution was out of place. In 1856 the anti-slavery party had made great progress and came near electing their candidate for President. It was hoped that the decision of the Supreme Court in the Dred Scott case (q.v.) would put an end to the political agitation, but the decision being adverse to the theories of the abolitionists added fuel to the flame. The Supreme Court and the venerable chief justice became objects of the most venomous abuse. In the controversy which now raged, moderation and reason seemed annihilated in the bitterness of feeling. The ablest minds of the North were exercised in constructing arguments to justify the coercive policy. Floods of anti-slavery literature were poured out before the impressionable youth. The pulpit and the lecture hall rang with appeals in which slander and denunciation were the key-notes, and the press took up and echoed their appeals.

While many people in the North were actuated solely by the belief that slavery was a wrong that should be abolished yet it was not until the question became one of national and political importance that the party opposed to the one in power used it as a means to secure control of the government. Like all other questions which become political, misrepresentations of the grossest character were made in order to attain political ends. Therefore, the pictures of slavery as presented to the Northern mind were in marked contrast to actual conditions as seen by those who were surrounded by them. It is true that there were

exceptional cases where there was apparent cruelty, and some cases where the slaves endured real hardships; and these cases were almost exclusively confined to the Mississippi and other alluvial bottom lands where the slaves were removed from the care and protection of their masters and were controlled by overseers, whose sole effort was each year to attain the highest financial results for their employers. But while the cases of hardship were few in number they were seized upon, colored and exaggerated in order to, so far as possible, inflame the Northern mind against the institution. The conditions as they appeared to the Southern people were, with rare exceptions, in marked contrast with the tales spread in the North. The planter of the South, or his ancestors, had seen the most degraded of human beings brought from Africa. Most of them had been, in their native land, slaves of tyrannical and cruel negro masters. They had become the property and in a certain sense members of humane, Christian families. The instincts of humanity and the interests of ownership had combined to lift these negro slaves from the lowest conditions of savagery into a state of civilization, where they were well fed, well clothed, protected and all their physical wants attended to, and furthermore where they were uplifted morally, surrounded by Christian influences and given Christian instruction. While slavery had its evils, history has record of no people who made so rapid an advance from a low condition of savagery and immorality to one of comparative civilization and moral responsibility as was shown by the improvement in the condition of the savage negroes that were brought to this country by the slave-traders. It has been charged that the Southern people took care of their slaves only because they were property and because the loss of a slave was a monetary loss. This charge is unjust in the extreme, and is in line with other calumnies which would deny all humanity to the slave-holding Southerners. The Southern people as a class cared well for their slaves, not only because they were property, but also because there was a real bond of affection between the master and the slave, and between all the members of the master's family and all the slaves in his house or on his plantation. Proof of the real conditions can be found in the following extract from Booker T. Washington's 'Up From Slavery':

> One may get the idea, from what I have said, that there was bitter feeling toward the white people on the part of my race, because of the fact that most of the white population was away fighting in a war which would result in keeping the negro in slavery if the South was successful.
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> In the case of the slaves on our place this was not true, and it was not true of any large portion of the slave population in the South where the negro was treated with anything like decency. During the Civil War one of my young masters was killed, and two were severely wounded. I recall the feeling of sorrow which existed among the slaves when they heard of the death of "Marse Billy." It was no sham sorrow, but real. Some of the slaves had nursed "Marse Billy"; others had played with him when a child. "Marse Billy" had begged for mercy in the case of others when the overseer or master was thrashing them. The sorrow in the slave quarter was only second to that in the "big house." When the two young masters were brought home wounded, the sympathy of the slaves was shown in many ways. They were just as anxious to assist in the nursing as the family relatives of the wounded. Some of the slaves would even beg for the privilege of sitting up at night to nurse their wounded masters. This tenderness and sympathy on the part of those held in bondage was a result of their kindly and generous natures. In order to defend and protect the women and children who were left on the plantations when the white males went to war, the slaves would have laid down their lives. The slave who was selected to sleep in the "big house" during the absence of the males was considered to have the place of honour. Any one attempting to harm "young mistress" or "old mistress" during the night would have had to cross the dead body of the slave to do so. I do not know how many have noticed it, but I think that it will be found to be true that there are few instances, either in slavery or freedom, in which a member of my race has been known to betray a specific trust.
>
> As a rule, not only did the members of my race entertain no feelings of bitterness against the whites before and during the war, but there are many instances of negroes tenderly caring for their former masters and mistresses.

As a general rule (the exception being in the bottom lands where but few white people lived except the overseers, and where the worst and most untractable negroes were sent) the virtue of the negro women was carefully guarded by the slave-owners, and for several reasons. First, the Southern people were, as they are to-day, essentially religious and, as above stated, took great care of the moral training of the negroes. In most of the small establishments the mistress of the house assumed this as one of her duties, and on most of the large plantations where there were from 100 to 1,000 slaves, a chapel was provided and a minister employed to teach religion and morals. A plantation upon which there were no mulatto children was the more valuable, and conveyed an idea of commendation which attached to all who were connected with it. In the third place marriage and chastity among the slaves were fostered and promoted for property reasons. So far did the Southern people go in protecting the female slaves that regular patrols were organized for the purpose of arresting and punishing the lower class of white men who prowled around at night among the negro cabins. Of course the Southern people were greatly incensed by the gross misrepresentations as to their cruelty and immorality, and believed that the object of these misrepresentations was to arouse a sentiment which would lead to the attempt of the Northern people, acting through the national government, to interfere with the right of self-government guaranteed by the Constitution, and to deprive them of their property. And the feelings of resentment which naturally followed widened the breach day by day, month by month and year by year; until it became apparent that only a cessation of the agitation could prevent complete separation of the two sections. So that from the moment of the John Brown raid into Virginia the South saw the necessity of preparing to protect its rights and property — in the Union if possible — out of it if necessary. These were the conditions when, in 1860, the anti-slavery or Republican party elected its candidate, not so much by the strength in the North of its own following as by the division among the Democrats. By the vote which elected Mr. Lincoln the South was given to understand that the Constitution was to be disregarded and slavery destroyed, and so destroyed as to bring financial ruin, if not utter annihilation upon the South, for Wendell Phillips, a recognized leader, has said «The state of things is just what we have attempted to bring about. . . . The Republican party is a party of the North, pledged against the South.» And the Southern people turned to the remedy which for three-quarters of a century they had believed to be the legal and proper one for

denial of rights by the national government, namely, withdrawal from the Union — secession.

The Doctrine of Secession.— As stated from the foundation of the Federal government until 1861, and even at that date, the right of secession was insisted upon not only in the South but in the North. In fact New England had been the first to advocate and threaten it. To discover the basis of this doctrine the history of the Federal government must be briefly reviewed. The colonies were settled by the Cavaliers in Virginia, the Puritans in New England, the Hollanders in New York, the Catholics in Maryland, the Quakers in Pennsylvania, the Huguenots in South Carolina and the followers of Oglethorpe in Georgia. The colonists of New England whose descendants spread westward were very different in their ancestry, their education, their beliefs and their customs, from those who settled the South and whose descendants spread over the Southwest. Those of New England were largely the descendants of the Roundheads of England, and entertained ideas similar to theirs. Those of the South sprang from the Cavalier class of England and France. The colonial States when they renounced their allegiance to Great Britain were separate and distinct commonwealths, entirely independent of one another. The desire for complete independence was the claim that welded their union in their efforts to achieve their common end. The political union of these independent colonies was based solely upon the terms of agreement and compact entered into by these separate and distinct bodies. The first union of this character was that formed by the 13 colonies in 1774, which was followed by the union of the States under the Articles of Confederation of 1777 (Maryland being the last State to ratify them, in 1781). On 4 July 1776, the colonies declared "that they are and of right ought to be *Free and Independent States*" — "that whenever any form of government becomes destructive of the ends for which it was established, it is the right of the people to alter or abolish it, and to institute a new government." In the Articles of Confederation the States, while agreeing to clothe the Congress with the powers of a common agent, expressly stipulated "that each State retains its sovereignty, freedom and independence and every power and right which is not, by this Confederation, expressly delegated to the United States in Congress assembled." Great Britain in Article I of the treaty of 3 Sept. 1783, "acknowledges the said United States, namely" (mentioning each of the 13 States), "to be *Free, Sovereign* and *Independent States*." The confederation under the Articles of 1777 was succeeded by the Union under the Constitution adopted by the 12 States assembled in Constitutional Convention (Rhode Island holding aloof) and subsequently ratified by all the States. It is to be remembered that until North Carolina ratified the Constitution in November 1789, and Rhode Island ratified it in May 1790, these two States were considered as entirely independent commonwealths.

In the Constitutional Convention, and therefore until 1861, the Supreme Court of the United States and the highest courts of the several States maintained in their decisions the principle of the unrelinquished sovereignty of each State, all holding that the central government had no right to exercise any powers, except such as were expressly delegated, or Congress to enact any laws except in pursuance of an express right granted by the States through the Constitution. This doctrine was formally enunciated in the tenth amendment to the Constitution: "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." The question of coercion of a State was raised in the Constitutional Convention and was quickly disposed of. When a proposition was made to empower Congress "to call forth the force of the Union against any member (meaning State) of the Union failing to fulfill its duty under articles thereof" — Mr. Madison said that "a union of the States containing such an ingredient seemed to provide for its own destruction. The use of force against a State would look more like a declaration of war than an infliction of punishment and would probably be considered by the party attacked as a dissolution of all previous compacts by which it might be bound." He hoped "that such a system would be framed as might render this recourse unnecessary, and moved that the clause be postponed." Madison's motion prevailed unanimously. Every similar proposition was rejected. George Mason said of such a proposition: "Will not the citizens of the invaded State assist one another, until they rise as one man and shake off the Union altogether?" Oliver Ellsworth in speaking to the Connecticut Convention said: "This Constitution does not attempt to coerce sovereign bodies, States, in their political capacity." Alexander Hamilton said in the New York Ratifying Convention: "To coerce the States is one of the maddest projects that was ever devised." Edmund Randolph, one of the most advanced of the Federalists, said that coercion was out of the question. When the States ratified the Constitution they expressed in no uncertain terms their insistence that the State could not be coerced and could at any time withdraw from the confederation and retake the powers granted to the Federal government. New York and Rhode Island said that "the powers of government may be reassumed by the people whenever it shall become necessary to their happiness." Virginia in ratifying did "declare and make known that the powers granted under the Constitution being derived from the people of the United States, may be reassumed by them, whensoever the same shall be perverted to their injury or oppression, and that every power not granted thereby remains with them and at their will." The principle of the right of secession had always been sanctioned by the people of Massachusetts. When it was proposed to annex Louisiana to the Federal Union, the legislature of Massachusetts passed the following resolution: "That the annexation of Louisiana to the Union transcends the constitutional power of the government of the United States. It formed a new confederacy, to which the States united by the former compact *are not bound to adhere*." And in 1844 and again in 1845 the same legislature resolved: "That the project of the annexation of Texas, unless arrested on the threshold, *may drive* these States into a *dissolution of the Union*."

Alexander Hamilton was without question one of the most extreme advocates of a strong central national government, but even he ex-

pressed himself emphatically that any attempt on the part of Congress to enact a law which involved the exercise of power which was not granted by the Constitution would be an invasion of the power reserved to the States. He discussed this question in the 31st number of the *Federalist,* and concludes in these words: «Hence we perceive that the clause which declares the supremacy of the laws of the Union, like the one we have just considered, only declares a truth which flows immediately and necessarily from the institution of a Federal government. It will not, I presume, have escaped observation, that it expressly *confines this supremacy to the laws made pursuant to the Constitution.*» At the time of the adoption of the Constitution, during the period of ratification and for many years thereafter this principle was not questioned. It was so thoroughly recognized that so long as any members of the Constitutional Convention remained members of Congress, and for a long period thereafter, that body confined its acts to expressly granted powers; and the messages of the Executive to Congress were only explanations of the condition and state of the Union — so very different from the messages since 1865 which are largely devoted to proposed policies of the administration, and exact from the President's party loyal obedience thereto.

In 1839 John Quincy Adams in his speech on the occasion of the 50th anniversary of our government under the Constitution said:

But the indissoluble union between the several States of this confederated nation is, after all, not in the right but in the heart. If the day should ever come (may Heaven avert it) when the affections of the people of these States shall be alienated from each other; when the fraternal spirit shall give way to cold indifference, or collision of interest shall fester into hatred, the bonds of political asseveration will not long hold together parties no longer attracted by the magnetism of conciliated interests and kindly sympathies; and far better will it be for the people of the disunited States to part in friendship from each other than to be held together by constraint. Then will be the time for reverting to the precedents which occurred at the formation and adoption of the Constitution to form again a more perfect Union *by dissolving* that which can no longer bind, and *to leave the separated parts* to be reunited by the law of political gravitation to the centre.

That Mr. Adams felt that these views were consistent with a true interpretation of the original compact which bound the people together is shown by the fact that three years later, 24 Jan. 1842, he presented to Congress a secession petition from citizens of Haverhill, Mass. In the *Congressional Globe* (Vol. II, p. 977) appears the following:

Monday, January 24.— In the House Mr. Adams presented the petition of sundry citizens of Haverhill, in the State of Massachusetts, praying that Congress will immediately adopt measures, peaceably to dissolve the Union of these States: First, because no union can be agreeable or permanent which does not present prospects of reciprocal benefits; second, because a vast proportion of the revenues of one section of the Union is annually drained to sustain the views and course of another section, without any adequate return; third, because, judging from the history of past nations, that Union, if persisted in in the present state of things, will certainly overwhelm the whole nation in destruction.

On the question of the reception of the petition, there were 40 votes in favor of it and 166 against. The following resolution was then introduced: «Resolved: That in presenting to the consideration of this House a petition for the dissolution of the Union, the member from Massachusetts (Mr. Adams) has justly incurred the censure of this House.» Another resolution was introduced declaring that Mr. Adams had offered the deepest indignity to the House and an insult to the people of the United States In defending his position Mr. Adams said:

I hold that it is no perjury, that it is no high treason, but the exercise of a sacred right to offer such a petition, and that it is as false in morals as it is inhuman to fasten that charge on men who, under the countenance of such declarations as I have here quoted, come and ask this House a redress of grievances. And if they do mistake their remedy this government should not turn them away and charge them with high treason and subornation of perjury; but ought to take it up, to weigh the considerations which can be urged in their favor; and if there be none but those which are so eloquently set forth in the pamphlet I have quoted, these should be considered. If they have mistaken their remedy, the House should do as the gentleman from Kentucky (Mr. Marshall) told us he was ready to do — admit the facts.

«The trial of Mr. Adams, to the exclusion of all other business, commenced on 25 January, and terminated on 7 February, when the whole proceedings were laid on the table without deciding a single question.» This action of the House was construed by some as an admission that circumstances might arise which would justify States in withdrawing from the Union. Daniel Webster in his speech at Buffalo on 22 May 1851 denounced the anti-slavery agitators who were opposing the enforcement of the Fugitive Slave Law, and demanded that they should observe the laws and the Constitution. And a little later, at Capron Springs, he said:

How absurd it is to suppose that when different parties enter into a compact for certain purposes, either can disregard any one provision, and expect, nevertheless, the other to observe the rest. . . . I have not hesitated to say, and I repeat, that if the northern States refuse wilfully and deliberately to carry into effect that part of the Constitution which respects the restoration of fugitive slaves, and Congress provide no remedy, the South would no longer be bound to observe the compact. A bargain cannot be broken on one side and still bind on the other side. I say to you, gentlemen in Virginia, as I said on the shores of Lake Erie and in the city of Boston, as I may say again in that city or elsewhere in the North, that you of the South have as much right to receive your fugitive slaves as the North has to any of its rights and privileges of navigation and commerce. . . . I am as ready to fight and fall for the constitutional rights of Virginia as I am for those of Massachusetts.

Horace Greeley, the abolitionist, strongly insisted, in 1860, upon the right of the Southern States to secede, as the following extracts from the *Tribune* show:

New York *Tribune*, 9 Nov. 1860.— If the cotton States shall become satisfied that they can do better out of the Union than in it, we insist on letting them go in peace. The right to secede *may* be a revolutionary one, but it exists nevertheless.

And again in the same issue of his widely circulated and influential paper, Mr. Greeley said:

We must ever resist the asserted right of any State to remain in the Union and nullify or defy the laws thereof. To withdraw from the Union is quite another matter; and whenever a considerable section of our Union shall deliberately resolve to go out, we shall resist all coercive measures designed to keep it in.

New York *Tribune*, 16 Nov. 1860.— Still we say, in all earnestness and good faith, whenever a whole section of this republic, whether a half, a third, or only a fourth, shall truly desire and demand a separation from the residue, we shall earnestly favor such separation. If the fifteen slave States, or even the eight cotton States alone, shall quietly, decisively, say to the rest, "We prefer to be henceforth separated from you," we shall insist they be permitted to go in peace.

New York *Tribune*, 19 Nov. 1860.— Now we believe and maintain that the Union is to be preserved only so long as it is beneficial and satisfactory to all parties concerned. We do not believe that any man, any neighborhood, town, county, or even State may break up the Union in any transient gust of passion; we fully comprehend that secession is an extreme, an ultimate resort — not a constitutional but a revolutionary remedy. But we insist that

this Union shall not be held together by force whenever it shall have ceased to cohere by the mutual attraction of its parts; and whenever the slave States or the cotton States only shall unitedly and coolly say to the rest, "We want to get out of the Union," we shall urge that their request be acceded to.

New York *Tribune*, 30 Nov. 1860.— Are We Going to Fight? — But if the cotton States generally unite with her in seceding, we insist that they cannot be prevented, and that the attempt must not be made.

New York *Tribune*, 24 Dec. 1860.— Most certainly we believe that governments are made for the peoples, not peoples for the governments; that the latter derive their just power from the consent of the governed; and whenever a portion of this Union, large enough to form an independent self-sustaining nation, shall show that, and say authentically to the residue, "We want to get away from you," I shall say, and we trust self-respect, if not regard for the principles of self-government, will constrain the residue of the American people to say, "Go."

New York *Tribune*, 28 Dec. 1860.— . . . Nor is it treason for the State to hate the Union and seek its disruption. A State, a whole section, may come to regard the Union as a blight upon its prosperity, an obstacle to its progress, and be fully justified in seeking its dissolution. And in spite of the adverse clamor, we insist that if ever a third or even a fourth of these States shall have deliberately concluded that the Union is injurious to them, and that their vital interests require their separation from it, they will have a perfect right to seek separation; and should they do so with reasonable patience and due regard for the rights and interests of those they leave behind, we shall feel bound to urge and insist that their wishes be gratified — their demand conceded.

During the time the States were seceding Mr. Greeley published many similar statements. Nor was the *Tribune* alone, for much of the New York press and prominent journals and able editors in many of the Northern States coincided in these views. «Wayward sisters, go in peace,» was the cry on every hand, echoed from the lips of the general of the army, with the refrain uttered by the eminent Republican leader Salmon P. Chase: «The South is not worth fighting for; let them alone.» The New York *Herald*, a journal which claimed to be independent of all party influences, said on 25 Nov. 1860: «Coercion in any event is out of the question. A Union held together by the bayonet would be nothing better than a military despotism.» And the same paper said: «Each State is organized as a complete government, holding the purse and wielding the sword, possessing the right to break the tie of the confederation, and to repel coercion as a nation might repel invasion. . . . Coercion, if it were possible, is out of the question.» The New York *Times* of 3 and 4 Dec. 1860 appealed to the people of the North to repeal the State laws preventing the return of fugitive slaves and by moderation and forbearance to prevent the threatened and almost inevitable dissolution of the Union. In March 1861, after Lincoln's inauguration, the *Commercial*, the leading Republican paper of Ohio, said:

We are not in favor of blockading the southern coast. We are not in favor of retaking by force the property of the United States now in possession of the seceders. We would recognize the existence of a government formed of all the slaveholding States and attempt to cultivate amicable relations with it.

In January 1861, after six States had seceded, James S. Thayer said, at a great meeting in New York:

We can at least, in an authoritative manner, arrive at the basis of a *peaceable separation*. . . . The public mind will bear the avowal, and let us make it,— that if a revolution of force is to begin, it shall be inaugurated at home. And if the incoming administration shall attempt to carry out the line of policy that has been foreshadowed, we announce that, when the hand of black Republicanism turns to blood-red, and seeks from the fragments of the Constitution to construct a scaffolding for coercion — another name for execution — we will reverse the order of the French Revolution, and save the blood of the people by making those who would inaugurate a reign of terror the first victims of a national guillotine!

These expressions were received with enthusiastic applause. At the same meeting ex-Gov. Horatio Seymour asked whether «successful coercion by the North is less revolutionary than successful secession by the South? At the same meeting ex-Chancellor Walworth said: «It would be brutal, in my opinion, to send men to butcher our own brothers of the Southern States as it would be to massacre them in the Northern States.» Other distinguished speakers and editors throughout the North and West repeatedly expressed the same sentiments. Even Mr. Lincoln, when delivering his inaugural address on 4 March 1861, although arguing the right to secede, did not openly enunciate the right of coercion, and while asserting his intention «to hold, occupy and possess the property and places belonging to the government, and collect the duties and imposts,» said that «beyond what is necessary for these objects there will be no invasion, no using of force, against or among the people anywhere.»

Course of Secession.— The Southern States having no hope of retaining or obtaining their rights under the Constitution except by a separation from the Federal government called conventions to decide upon what course to pursue, and ended by withdrawing from the Union. South Carolina took the lead, her Ordinance of Secession being adopted 20 Dec. 1860. Six other States quickly followed her in the following order: Mississippi on 9 January, Florida on 10 January, Alabama on 11 January, Georgia on 18 January, Louisiana on 23 January and Texas on 1 Feb. 1861. As one by one the Southern States fell into line asserting their right and determination to renounce the Federal compact, the United States officials in these States, both military and civil, peacefully turned over their charge within the limits of each State to the authorities of the same, the only exceptions being the isolated fortifications of Fort Sumter and Fort Pickens. The machinery of government went on without delay, the same officials performed their customary duties, and when the provisional government was established the only change was the substituting the authority and name of the Confederate States for those of the United States. On 21 Jan. 1861 Jefferson Davis, in his speech when relinquishing his seat in the United States Senate, said:

I rise, Mr. President, for the purpose of announcing to the Senate that I have satisfactory evidence that the State of Mississippi by a solemn ordinance of her people, in convention assembled, has declared her separation from the United States. . . . If it be the purpose of gentlemen they may make war against a State which has withdrawn from the Union; but there are no laws of the United States to be executed within the limits of a seceded State. A State, finding herself in the condition in which Mississippi has judged she is — in which her safety requires that she should provide for the maintenance of her rights out of the Union — surrenders all the benefits (and they are known to be many), deprives herself of the advantages (and they are known to be great), severs all the ties of affection (and they are close and enduring), which have bound her to the Union; and thus divesting herself of every benefit — taking upon herself every burden — she claims to be exempt from any power to execute the laws of the United States within her limits . . . We recur to the principles upon which our government was founded; and when you deny them and when you deny to us the right to withdraw from a government which, thus perverted, threatens to be destructive of our rights, we but tread in the path of our fathers, when we proclaim our independence and take the hazard.

Here in the words of the man who was afterward the chosen chief of the reorganized federation, the reason for secession is given and the right of secession claimed. The senators from Florida and Alabama withdrew at the same time.

The Peace Congress.— On 19 Jan. 1861, the legislature of Virginia in extraordinary session passed a resolution requesting all the States to send delegates to Washington to meet in convention on 4 February to confer upon some feasible and possible plan upon which to settle the difficulties between the sections. The body which is known in history as the Peace Congress sat in Washington from 4 to 27 February, but accomplished nothing. Five Northern States were not represented, and while there still existed a very conciliatory spirit in many parts of the North, it was unfortunate that many prominent men were bitterly opposed to the slightest concessions to the South. The speech of Judge Chase of Ohio, afterward Chief Justice of the United States, distinctly gave it to be understood that the Northern States would make no concessions. He said:

The result of the national canvass which recently terminated in the election of Mr. Lincoln, has been spoken of by some as the effect of a sudden impulse or of some irregular excitement of the popular mind; and it has been somewhat confidently asserted that, upon reflection and consideration, the hastily formed opinions which brought about that election will be changed. . . . I cannot take this view of the result of the presidential election. I believe, and the belief amounts to absolute conviction, that the election must be regarded as a triumph of principles cherished in the hearts of the people of the free States. . . . We have elected him [Mr. Lincoln]. After many years of earnest advocacy and of severe trial we have achieved the triumph of that principle. By a fair and unquestioned majority we have secured that triumph. Do you think we, who represent this majority, will throw it away? Do you think the people will sustain us if we undertake to throw it away? I must speak to you plainly, gentlemen of the South. It is not in my heart to deceive you. . . therefore tell you explicitly that if we of the North and West would consent to throw away all that has been gained in the recent triumph of our principles, the people would not sustain us, and so, the consent would avail you nothing.

The *Congressional Globe*, Vol. 31, Part 2, p. 1247 (27 Feb. 1861) contains letters from Senators Bingham and Chandler to Governor Blair of Michigan. Senator Bingham wrote as follows:

Washington, 15 Feb. 1861.

Dear Sir:— When Virginia proposed a convention in Washington in reference to the disturbed condition of the country I regarded it as another effort to distract the public mind, and a step towards obtaining that concession which the imperious slave power so insolently demands. . . . We have been assured by friends upon whom we can rely that if those two States, Michigan and Wisconsin, should send delegations of true unflinching men, there would probably be a majority in favor of the Constitution as it is, who would frown down rebellion by enforcement of laws. . . . It cannot be doubted that the recommendations of the convention will have a considerable influence upon the public mind, and upon the action of Congress. . . .

I hope I shall be pardoned for suggesting that it may be justifiable and proper, by any honorable means, to avert the lasting disgrace which will attach to a free people who, by the peaceful exercise of the ballot, have just released themselves from the *tyranny of slavery*, if they should now succumb to treasonable threats, and again submit to degrading thraldom. . . .

K. S. Bingham.

To His Excellency, Governor Blair.

Senator Zach Chandler wrote:

Washington, 11 Feb. 1861.

My dear Governor:— Governor Bingham and myself telegraphed you on Saturday, at the request of Massachusetts and New York, to send delegates to the Peace or Compromise Congress. They admit that we were right, and that they were wrong; that no Republican State should have sent delegates; but they are here and they cannot get away; Ohio, Indiana, and Rhode Island are caving in, and there is danger of Illinois; and now they beg us, for God's sake, to come to their rescue, and save the Republican party from rupture. I hope you will send *stiff-backed* men, or none. The whole thing was gotten up against my judgment and advice, and will end in thin smoke. Still, I hope, as a matter of courtesy to some of our erring brethren, that you will send the delegates.

Truly your friend,

Z. Chandler.

His Excellency, Austin Blair.

P. S.— Some of the manufacturing States think that a fight would be awful. Without a little *blood-letting*, this Union will not, in my estimation, be worth a rush.

These letters were promptly published in the Detroit *Free Press* and also in the *Congressional Globe*. Senator Powell commenting, in the Senate, upon the letters, said: "I think it evident from these letters that there is and has been a fixed purpose in certain quarters, that the peace conference should do nothing. It is very evident that these 'stiff-backed' gentlemen were to be sent in order to prevent any compromise being presented." Senator Chandler said: "It is a question in which the people of Michigan take a great interest. They are opposed to all compromises; they do not believe that any compromise is necessary, nor do I. They are prepared to stand by the Constitution of the United States as it is; ay, sir, to stand by it to blood, if necessary." A majority of the convention or congress was sufficiently moderate to recommend a measure to Congress which would, without doubt, have preserved peace and union, but when presented to the United States Congress it was met with cool indifference, objection was made to its consideration and upon a vote it was rejected.

The failure of the Peace Congress and the finally expressed determination of the government to make no concessions and to exercise the forces of the government in coercion forced Virginia and the other so-called border States from their conservative position. Arkansas adopted an Ordinance of Secession on 15 April, and Virginia on 17 April. In the latter State the Ordinance was to be made subject to the ratification of the people late in May, but the action of the Federal government in preparing for war and the proclamation of President Lincoln calling for troops hastened her union with her sister States of the South. Tennessee passed an Ordinance of Secession on 6 May, which was ratified by the people on 8 June, and North Carolina seceded on 20 May. Such a division of sentiment existed in Kentucky and Missouri that while they did not secede they were given representation in the Confederate Congress.

Formation of the Confederate Government.— In the meantime the several conventions of the first seven seceded States appointed deputies to a congress, naming Montgomery, Ala., as the place and 4 February as the time of meeting. This assembly formed a new federation under the name of the Confederate States of America, elected Jefferson Davis of Mississippi, President and Alexander H. Stephens of Georgia, Vice-President, and drew up a Constitution establishing a provisional government, and on 11 March adopted the permanent Constitution of the Confederate States. Alexander Stephens, who knew his people, had distinctly declared that "the tendency of the large majority of Georgia is to conser-

vatism,» and this was true as well of all the other States. It was Mr. Lincoln's proclamation of 15 April that destroyed the last remaining vestige of the hope entertained by the conservatives that a return to the principles of the Constitution by the people of the North and the Federal government might bring about a reconstruction of the Union, a hope to which their hearts still clung tenaciously. Had not two States held aloof from the compact of 1787 to return in 1789 and 1790? Why might not history repeat itself? they thought and argued. The seat of government of the Confederacy was removed to Richmond, Va., and the Provisional Congress met there on 20 July 1861. At this session delegates from Virginia, North Carolina and Tennessee were added to the body. The Second Congress met on 22 Feb. 1862, with full representation from Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas and Virginia. In the Second Congress which convened on 22 Feb. 1862, the 13 States above named were represented and delegates were present from Arizona and from the Cherokee, Choctaw, Creek and Seminole Nations.

Secession of West Virginia.—As above noted the Virginia Convention passed an ordinance of secession on 17 April 1861, which was submitted to the people and adopted by them. There was a majority against it in the northwestern part of the State. In June 1861, a convention of the Unionist counties was held in Wheeling. This convention adopted an ordinance for a reorganization of the State government, and in August adopted an ordinance providing for the formation of a new State. Most of the citizens being in the field as soldiers on one side or the other, a very small vote was polled, but a majority was for the formation of a new State. In May of 1862 the «reorganized government» of this part of Virginia passed a bill authorizing the formation of a new State. On 31 Dec. 1862, the Congress of the United States passed an act admitting the State of West Virginia into the Union, the law having the following preamble:

> *Whereas*, the people inhabiting that portion of Virginia known as West Virginia did, by a convention assembled in the city of Wheeling on the twenty-sixth of November, eighteen hundred and sixty-one, frame for themselves a Constitution with a view of becoming a separate and independent State; and whereas at a general election held in the counties composing the territory aforesaid on the third day of May last, the said Constitution was approved and adopted by the qualified voters of the proposed State; and whereas the legislature of Virginia, by an act passed on the thirteenth day of May, eighteen hundred and sixty-two, did give its consent to the formation of a new State within the jurisdiction of the said State of Virginia, to be known by the name of West Virginia, and to embrace the following named counties. . . .; and whereas both the convention and the legislature aforesaid have requested that the new State should be admitted into the Union, and the Constitution aforesaid being Republican in form, Congress doth hereby consent that the said forty-eight counties may be formed into a separate and independent State.

The End of Secession.—Although the Supreme Court of the United States several times decided that the seceded States were never *legally* out of the Union, yet for four years the secession of 11 States was an accomplished fact, and for four years the Confederate States of America was a *de facto* government, exercising, through its executive, legislative and judicial departments, all the powers and functions of a Federal government within the territory of the States which comprised it, under a constitution modeled upon the Constitution of the United States and adopted and ratified by the people of its States. In the States themselves there was no change nor interruption in any of the affairs of government except in the places which were occupied by the Federal armies. But by force of arms the Confederate government was overthrown and each of the seceded States, after a period of reconstruction, came back and took its place in the Union under the old Constitution as amended by the victorious party in the great conflict. See also Civil War; United States — Causes of the Civil War; United States — Secession.

Brig.-Gen. Joseph Wheeler,
Author of 'Military History of Alabama.'

SECESSIONISTS, the members of an association in Germany similar to that formed in the Société des Beaux Arts at Paris. The Secessionists were artists who revolted against the strictly academic and traditional spirit in which selections and awards were made by the jury which decided the hanging of pictures in the Academy of Art and distributed the medals and other awards voted to their merits. In 1892 Piglhein (q.v.), F. von Uhde (q. v.), Dill, A. Keller, Stück and others founded a new school of naturalism, and this movement in German art was greeted with the same howl of derision as that with which the Pre-Raphaelites in England had been met. The movement gained ground, especially in Munich, however, the headquarters of a strong conservative and academic coterie. The new spirit here burst into actual revolt; and the members of the «Munich Secession» actually built a new exhibition building for themselves. Their work, moreover, won public recognition and the leaven of their example did its work in vivifying German art. The movement is now merged in the Deutscher Künstlerbund founded in 1904. Consult Bierbaum, 'Fritz von Uhde'; De la Mazelière, 'La peinture Allemande au XIXe siècle' (1900).

SECESSIONVILLE, sē-sĕsh'ŏn-vĭl, **Battle of.** In May 1862, Gen. D. Hunter, commanding the Department of the South, began preparations for throwing troops upon James Island to make a quick advance upon Charleston, S. C. On 2 June the advance of Gen. I. I. Stevens was landed in the southwest part of the island, and next day made a reconnaissance in force to within a short distance of a battery at Secessionville, about two miles from Stone River, with water on three sides. It was on a narrow causeway bordered by swamps, and approachable by land only from the west. The gunboats co-operated in the movement, which was but partially successful, the Confederates, under Lieut-Col. Ellison Capers, 24th South Carolina, defending the position and inflicting upon Stevens a loss of 17 killed and wounded and taking 22 prisoners. The effect was increased watchfulness on the part of the Confederates, the strengthening of the forces on James Island and the stoppage at Charleston of troops that had been ordered to Richmond to resist McClellan. On the 8th Stevens made another reconnaissance, came under artillery fire and withdrew with a loss of seven killed and wounded. On the same day General Wright's division arrived from Edisto

Island and the next day marched to near Grimball's Landing, two or three miles to the left of Stevens, who was covering the position opposite Legareville, on John's Island. It was determined to carry the battery by a rush, and thus open the way to Charleston, but 10 miles distant; and orders were given for an assault to be made at dawn of 11 June, but Col. T. G. Lamar, in command of the Confederate works at Secessionville, assumed the offensive and toward evening of the 10th attacked Wright's pickets and advance posts with infantry and artillery and was repulsed, suffering severe loss and inflicting upon Wright a loss of about 25 killed and wounded. This caused a postponement of the assault and the beginning of the construction of a battery to silence the Confederate guns. General Hunter, disappointed in his expectation of carrying Charleston with a rush, returned to Hilton Head on the 11th, leaving orders with General Benham, next in command, to make no attempt to advance on Charleston or on Fort Johnson until largely reinforced but to provide, however, for "a secure intrenched encampment." At the end of five days the battery had been constructed, but it failed to silence the Confederate guns, and Benham, as Hunter says, "disobeyed positive orders and clear instructions" and against the emphatic protest of his two division commanders proceeded to assault the work. He had for the purpose 3,100 men under General Wright and 3,500 under General Stevens. The work to be assaulted had an earthen parapet seven to eight feet high, outside of which was a ditch seven feet deep and in front of which was a strong abatis. A line of rifle-pits extended on both flanks and in the rear, sweeping the open interior of the work. Its armament was six heavy guns — 8-inch columbiads and rifled 24- and 18-pounders. It was defended by about 1,000 men, and there were supports near that came at the close of the action. Stevens, with his 3,500 men, was to make the assault and Wright, moving from Grimball's Landing, was to co-operate by moving on his left and rear. Stevens had two brigades, Colonel Fenton's (8th Michigan, 7th Connecticut, 28th Massachusetts) and Colonel Leasure's (46th and 79th New York and 100th Pennsylvania), and four guns. At 3.30 A.M., the troops were assembled beyond the camps and at 4 A.M., when it was so dark one man could not follow another except at short intervals, the column moved forward, Fenton leading, with a storming party of two companies of the 8th Michigan, closely followed by the other eight companies of the regiment, the 7th Connecticut and the 28th Massachusetts. Leasure followed Fenton. The advance moved quietly and when within 800 yards of the work surprised and captured a small picket-guard without firing a shot and orders were given to accomplish the allotted task with the bayonet only. Lamar had knowledge of the movement and had sent for reinforcements and was standing by his heavy guns, which had been charged with canister, as the leading regiment came within 300 yards and deployed into line; then his guns opened their canister-fire, and at the same time heavy volleys of musketry from dikes and hedges were poured upon the right flank of the assaulting column. The Union regiments closed up rapidly and made a rush for the work, shooting down the gunners; all the regiments got close to the work and men of each went through the abatis; men of the 8th Michigan and 79th New York gained the ditch and scaled the parapet. "Some of them," says Beauregard, "in the impetus of the assault went even inside one of the salients of the works"; but it was of no avail; the mingled Union troops could not be handled and at 5 o'clock, after a severe contest of 25 minutes, they fell back 500 yards to a hedge, under cover of artillery, with a loss of over 500. Wright had participated in the movement by checking a reinforcement on its way to the work, but did not become seriously engaged, although losing some men. At 9 o'clock Benham ordered Stevens back to camp. The Union loss was 107 killed, 487 wounded and 89 missing, an aggregate of 683. The Confederates report a loss of 52 killed, 144 wounded and 8 missing. The result of the battle was fatal to the plan of an immediate advance on Charleston and late in June the Union troops were ordered to withdraw from James Island and for some time to come no further attempt was made to capture the city. Consult 'Official Records,' Vol. XIV.

E. A. CARMAN.

SECHEM, Palestine. See NABULUS.

SECHIUM, a genus of the gourd family (*Cucurbitaceæ*) with one species (*S. edule*). This is a perennial, rough-stemmed, climbing vine native to the West Indies and the neighboring mainland, sometimes cultivated for covering arbors, since it makes a rapid and sturdy growth, but chiefly for the valuable food afforded by its roots and fruits. It has large, thin, heart-shaped leaves five-angled like those of the cucumber; branched tendrils opposite the leaves, and yellowish, monœcious flowers, the pistillate solitary or paired in the axils, the staminate in a raceme. These flowers have rotate calices and five-parted corollas and a one-celled ovary with six-lobed stigma, which matures into a pear-shaped fruit, some six inches long. It has an irregularly ribbed or furrowed surface slightly spiny, but shining, and in color ranging from pale green to creamy tints; the interior is fleshy and white, and contains a large flat seed, which germinates within the pericarp, often before it falls from the vine, so that the whole fruit is planted. This fruit is edible, as is also the very large, corky and starchy root-tuber, sometimes weighing 20 pounds, and both are cooked as vegetables having somewhat the flavor of turnips. The sechium fruit is called vegetable pear in the British colonies, and has local names such as chayote or pepinella.

SECKENDORF, Friedrich Heinrich, frēd'rĭH hīn'rĭH zĕk'ĕn-dôrf, COUNT VON, Franconian soldier and diplomat: b. Königsberg, 5 July 1673; d. Meuselwitz, Germany, 23 Nov. 1763. He served in the war against the Turks on the Danube, and in that of the Spanish Succession, greatly distinguished himself at Blenheim in 1704 and was present as an Ambassador at the conclusion of the Peace of Utrecht. He also served in the war against Sweden, 1715, and against the Spaniards in Sicily, 1720. In 1726 he was Ambassador to Berlin and gained over Frederick William I to acknowledgment of the pragmatic sanction and an alliance with Austria.

Seckendorf next served in the War of the Polish Succession, gaining victory over the French at Klausen. During the Turkish War he was made field marshal in 1737, and commander in chief. He was unsuccessful, however, and was recalled and imprisoned in the fortress of Grätz. Receiving no appointment when released, he entered the service of Charles VII of Germany against Maria Theresa. He cleared Bavaria of Austrian troops, but on the emperor's death in 1745 peace was established and Seckendorf was restored to his Austrian honors. He retired to his castle at Meuselwitz, but in 1758 was imprisoned by Frederick II of Prussia, on a charge of intriguing against that country, and was only released after six months upon the payment of 10,000 thalers.

SECOND, a division of time, the 60th part of a minute of time or of a minute of a degree. The hour and degree are each divided into 60 minutes (marked thus, 60′), and each minute is subdivided into 60 seconds (marked thus, 60″).

SECOND ADVENT OF CHRIST. See MILLENNIUM.

SECOND ADVENTISTS. See ADVENTISTS.

SECOND CENTURY. Many scholars agree with Edward Gibbon in looking back to the 2d century as the acme of ancient civilization: "If a man were called to fix the period in the history of the world during which the condition of the human race was most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian to the accession of Commodus"—that is, from 96 to 180 A.D. (*Decline and Fall of the Roman Empire,* vol. 1, chap. 3, 1776).

When the 2d century began the Roman Empire embraced the whole civilized world of the West, about the shores of the Mediterranean Sea, an area between 1,500 and 2,000 miles in breadth by about 3,000 miles in length, that is, an area of nearly 2 million square miles of fertile and productive land, with a population that has been estimated at between 75 million and 100 million. Politically the empire was still a military monarchy, but the evils of absolutism, especially as combined with emperor worship, were somewhat mitigated during the period between Domitian and Commodus, and a series of able rulers, the ablest since Augustus, governed this vast region with justice and efficiency. Men were aware of the signal benefits of the new era, following the unbearable tyrannies of such rulers as Caligula, Nero, and Domitian. Trajan forbade Pliny the Younger, the governor of Bithynia, to pay attention to anonymous informers against the Christians; such a procedure was "unworthy of our enlightened age." In turn the governor repeatedly stressed the "tranquillity and public order" which characterized the new era.

THE EMPERORS OF THE 2D CENTURY

The period comprising the final years of the 1st century and most of the 2d century was the age of the five "good" emperors: Nerva (r. 96–98), Trajan (r. 98–117), Hadrian (r. 117–138), Antoninus Pius (r. 138–161), and Marcus Aurelius (r. 161–180). Following them, the swift decline which began with Commodus (r. 180–192) led to the vast disorder and mounting crises of the succeeding centuries. Pertinax and Didius Julianus (193) openly made financial bids for the imperial succession but were followed at once by Septimius Severus (r. 193–211) who was the choice of the army. The legions had made and unmade rulers in the days of the triumvirs (1st century B.C.) and again in the year of the four emperors (69 A.D.); from the reign of Commodus onwards they were to play once more an increasing role in the making and unmaking of monarchs. Against the background both of what went before and what followed after, the reigns of the five good Spanish emperors (most of them were at least of Spanish descent) appeared to later historians and to contemporaries alike as a kind of golden Indian summer, which lingered for almost a century before the frosts and storms of the long dark winter set in.

Nerva.—Marcus Cocceius Nerva was a distinguished senator and jurist, chosen by the Senate to succeed the despotic Domitian when he was assassinated in September 96 A.D. Since Nerva was 66 years old, it was obvious that his election was only a temporary solution. Yet even in his brief reign he did much to re-establish peace and confidence, especially in remote regions. His crowning achievement was the appointment of his successor, the ablest administrator and general in the army, Trajan, then at Cologne.

Trajan.—More than anyone else Trajan (Marcus Ulpius Trajanus) laid the foundations of peace and prosperity for the Antonine age. By 107 A.D. he had overcome the inherited deficit, and with fresh supplies of precious metal taken in his Dacian Wars (101–102; 105–106), and with 50,000 able-bodied prisoners, he embarked upon a vast program of public works in which the provinces vied with Italy. Trust funds were set up for the care of the poor and for public education of freeborn children, partly no doubt in the interest of maintaining the free Italian population in the face of rising foreign-born groups. The impetus to architecture continued through the reign of Hadrian; forums, baths, theaters, basilicas, circuses, hippodromes, aqueducts, harbors, the impressive ruins of which survive to this day, attest the wealth and magnificence of the period.

The Dacian Wars extended the boundary of the empire to its farthest northeastern limit. That frontier now extended 1,300 miles from the mouth of the Rhine to the mouth of the Danube. Only one strip lay open, between the east bank of the Danube and the west bank of its tributary the Theiss (Tisza); a Roman wall at its southern end converted this 200-mile corridor into a cul-de-sac, and, thus protected, Dacia (q.v.) remained Roman until the Gothic invasions of 250–270. The whole later history of Europe would undoubtedly have been very different had the Roman Empire enjoyed another century of peace and prosperity, and been able to extend its northeastern border to the Elbe, the Oder, or the Vistula; if this had occurred a much shorter line could have been completed via the Carpathians to the southeast, one which might later have held the Huns in check.

Trajan's victories in the East resulted in the creation of new provinces: Armenia (114), Mesopotamia (114–115), and Nabataea (105), where a permanent road was built (111–114) from the borders of Syria to the Red Sea in which a Roman fleet was stationed. Trajan died while returning from an expedition against the Parthians, and his annexation of Armenia and Meso-

potamia was promptly repudiated by Hadrian. There was in fact no natural frontier on the east, any more than on the northeast, and this set a problem which was destined to vex Roman policy while the empire lasted. Theoretical lines drawn along the Caucasus Mountains from the Black Sea to the Caspian Sea, and from the Caspian Sea to the Persian Gulf, or following the mountains and deserts to the Gulf of Oman, would have sufficed to hold back only theoretical foes—not the nimble Parthians who could leap any wall, swim any river, and had been born to the saddle. The withdrawal by Hadrian was the only sensible thing to do, but it was a signal observed by the whole barbarian world. Rome was never able to assimilate, that is, to Romanize, these far eastern territories lying beyond Syria and the Euphrates River. On the south, the borders of the empire were extended to the Sahara and the Libyan deserts, and in the African provinces the building operations of the north and west were repeated.

Hadrian.—Hadrian (Publius Aelius Hadrianus) was a very different person from Trajan, though his cousin. His versatility was world-famous; he was a patron of literature and art, and especially generous to the ancient Greek cities where classical civilization had been born. The ruins of his villa at Tivoli still attest his unbounded enthusiasm for art, literature, mythology, and archaeology. Like most of the good emperors, he was a tolerant, cosmopolitan, and enthusiastic promoter of the common good. More than half of his time was spent in the provinces, Hellenizing, Romanizing, and organizing their social and political life. He encouraged the work of the great jurists in collecting, codifying, and expounding the whole body of Roman law. He insisted upon freedmen occupying posts of responsibility in the government, and made the civil service a profession sufficiently lucrative to attract well-trained men. He instituted the famous Roman postal system.

Unlike Trajan, Hadrian was not a professional soldier, although he successfully concluded the Jewish War of 132–135. But the madness which cursed his later years had been already apparent when he provoked that war by decreeing the erection of a pagan city, Aelia Capitolina, on the ruins of Jerusalem, with a temple to Olympian Zeus (Juppiter), now identified with himself! The whole Jewish world rose in revolt. His increasing megalomania and self-identification with deity led also to the opposition of the Christians, who refused to acclaim him *dominus et deus*—the same opposition Domitian had aroused, and which had led to the protest of the Revelation of John (q.v.).

Hadrian's plaintive death song, the oft-quoted *Animula, vagula, blandula* ("Little soul, little wanderer, little darling, soon to go down to the cold, pale, naked underworld, never to smile again . . ."), is not the language of the great emperor in the heyday of his power and magnificence, and should not be viewed as characteristic of him. The man was sick, physically and mentally, indeed he was dying. But the verses do reflect the enfeeblement of spirit which was steadily sapping the inner vitality of the empire, for all its external splendor and apparent prosperity.

Antoninus Pius.—Much less is known about Antoninus Pius: his virtues were of the modest kind, and he had no vices to make his life interesting to the scandalmongers. What Marcus Aurelius says of him is enough to convince us that his reign of 23 years must have been one of the happiest in all history. He was a true "father of his country." Under him "all the provinces flourished." By his economical administration the treasury accumulated a large surplus. Under his peaceful reign the spread of the Oriental cults, especially the cult of the Unconquerable Sun, took on new impetus, and along with them went a renewed emphasis on astrology—but also a greater propaganda for popular philosophy. During his reign, in 147, came the 900th anniversary of the founding of Rome; the Alexandrians hailed him as the World Redeemer Heracles, the benefactor of all mankind. In this aura of pagan sanctity he laid down his life peacefully at Lorium in March 161.

Marcus Aurelius.—Perhaps the most interesting of the good emperors was the last, Marcus Aurelius Antoninus, who reigned for the next 19 years. We know more about Marcus Aurelius, as a man, than about any other Roman emperor, since his *Meditations* (or, better, "A book for myself") contains his whole life-philosophy; it is one of the noblest documents of ancient Stoic piety and speculation, and along with the works of Seneca and Epictetus the fullest exposition of the later Roman type of Stoicism.

But it was Marcus' ill fortune to be compelled to face the accumulated liabilities and the mounting misfortunes which had resulted from the long era of prosperity following Trajan. During these 44 years the Parthians in the east and the German tribes north of the Danube had bided their time and were now ready to seize the territory of what they assumed to be the feeble because pacific power of Rome. Under the able generalship of Avidius Cassius, the Romans repulsed the Parthians, and the two capitals of Parthia, Seleuceia and Ctesiphon, were captured and destroyed (164). The victory was a costly one, however, for the Roman troops brought home with them a plague which spread everywhere and decimated the whole population of the west and north, as far as the Rhineland. It lasted for many years, and may have been one of the causes which led to that strange loss of vitality which characterized the decline of the empire in the following centuries. The restive northern tribes which invaded the Danube Valley and northeastern Italy in 167 were completely defeated by 180; but the effort required the absence of the emperor from Rome during much of this time—Book I of his *Meditations* ends, "Among the Quadi."

This absence was most unfortunate for Marcus, both personally and publicly; these were the years when his son and successor, Commodus (b. 161), was growing up. Lacking firm parental restraint, the young prince became utterly spoiled and irresponsible. The colossal blunder of Marcus in appointing his own son as his successor blots out much of the solid achievement of his difficult but nobly pursued career. There was never a Roman ruler more devoted to the highest conceptions of public duty; and surely there was never a more tragic instance of parental blindness.

Commodus.—The ill-starred reign of Lucius Aelius Aurelius Commodus lasted for 13 years. The poison of autocratic power seems to have unbalanced his mind. Commodus persecuted the Senate, renamed Rome after himself, *Colonia*

Commodiana, and named the months after his own names and titles, 12 in number. As the incarnation of Hercules he planned to appear publicly on Jan. 1, 193, as both consul and gladiator; but his mistress Marcia, his chamberlain Eclectus, and his praetorian prefect Laetus conspired to have him put out of the way.

The century ended in gloom and foreboding of worse things yet to come. The two puppets who followed Commodus were short-lived, and then, in 193, began the dynasty of the Severi, who had little regard for Roman traditions but were oriented toward the East. So powerful and well established was the new *Imperium Romanum* that it could not die overnight; yet its decline had now begun, and sooner or later its eventual fall was inevitable. The closing years of the 2d century were a twilight following a sunny day—a deepening twilight which presaged the long night of storm and tempest that followed.

PEACE AND PROSPERITY IN THE ROMAN EMPIRE

Yet while it lasted, the era of peace and prosperity under the good emperors brought to the world blessings which have never been wholly lost or forgotten. For once in history, this was a period without serious threat of invasion from without or of revolution within. For three generations and more, men lived in a civilized society and passed on to their barbarian neighbors the accumulated inheritance of learning, art, letters, philosophy, and the science of government—an inheritance which began in the Hellenistic age and, in spite of threats and reverses during the interval, had really grown in magnitude and significance. In fact, the civilizing (that is, Hellenizing) process begun in the Near and Middle East by Alexander the Great was now being carried to its conclusion in the West. For example, Greek was still spoken and written in Italy, Gaul, and North Africa. Hermas in Rome and St. Irenaeus in Gaul wrote in Greek, and the persecuted churches in Vienne, near Lyon, c.177 wrote their accounts of the martyrdoms in Greek. The Old Latin Version of the Bible was begun c.150, but hitherto the Greek text had served in North Africa, Italy, and Gaul. Even the *Meditations* of the emperor Marcus Aurelius were written in Greek.

Government.—Although the emperors were now virtually absolute dictators, since the Senate had declined in influence for over a century, the government was efficient, staffed largely by men of the equestrian order; taxes were moderate, and were collected now by officials rather than by tax farmers; the law was studied scientifically, and accurately codified; vast building operations were undertaken not only in Rome but in the provinces, especially under Hadrian; the city governments were well organized; public schools were established; farm relief was provided through government loans, the interest being used to educate poor country children; slavery was dying out, and it was easier for slaves to obtain freedom; world trade had reached its utmost expansion—even silk from China and cotton from India could be purchased in the cities of the West.

Intellectual and Religious Life.—Some of the great writers of later antiquity belong to the 2d century: the historians Cornelius Tacitus, Dio Cassius, Suetonius, Arrian; the philosophers Epictetus and Marcus Aurelius; the essayist and biographer Plutarch; the satirists Lucian and Juvenal; the novelist Apuleius; the orator Dio Chrysostom; the traveler Pausanias; the physician Galen; the geographer and astronomer Ptolemy; the letter writers Pliny the Younger and Marcus Cornelius Fronto. Among Christian writers some of the later New Testament authors belong early in the 2d century, and following them, the Apologists, then Tertullian and St. Irenaeus. Yet with all the intellectual and religious activity of the age, and its general contentment and security, there was little indication of fresh progress. Rhetoric, that is, oratory, was still the crown of education, not philosophy, science, or history.

The ancient religious cults were dying; for the majority, astrology and the Oriental mysteries had taken their place—such cults as those of Isis, Cybele, and Attis, and, above all, Mithras. For the educated, a refined type of personal philosophy sufficed, usually Stoicism or a revived and purely spiritual type of Platonism. The most vital religious movement of the period was Christianity, which had reached a point by c.197 where Tertullian could say, "We are of yesterday, yet we penetrate your courts, your markets, your armies" (*Apology,* 37). The persecutions, thus far, had been only local and sporadic, usually outbursts of mob violence, as in Bithynia in 112 or at Vienne in Gaul in 177. The widespread official efforts to stamp out the new religion came later, under the emperors Decius and Diocletian.

Spread of Roman Culture.—The civilizing mission of Rome was accomplished, not by coercion or restraint or by force of arms or the transplanting of populations, but by the peaceful methods of example, public education, the just administration of law, a widespread commerce, and by the ubiquitous establishment of cities, towns, and country villas in which the urbane Roman type of life was cultivated, exemplified, and enjoyed. Civilization was thus made attractive to multitudes of peoples along the far-flung frontiers of the empire and among the nations only recently incorporated within it. Whatever it had been originally, it was now a self-sustained culture, expanding by its own inner attractiveness to other peoples. The tragedy, for all later history, is that it ended too soon, before its task was done, and before it had reached and transformed more of the barbarian and savage peoples to the north and east, whose onslaughts on the Roman world in the 4th and 5th centuries almost extinguished European civilization. Where Roman culture had really taken root, it survived to some extent the Dark Ages that followed, and in turn passed on its blessings to the new peoples.

This culture was not limited to the provincial aristocracy, although naturally it was centered in the upper classes. Emperor Caracalla's grant of Roman citizenship to all freemen throughout the empire, in 212, was only the climax of a long process of education and preparation for responsibility, a process more marked in the provinces than in Rome itself, where a large part of the populace still lived on the dole, and where it was possible for landless farmers and vintners from every part of Italy and for the drifting unemployed of a whole empire to gather and be fed.

Economic Conditions.—It is estimated that the city of Rome in the 2d century had a population of over a million, of whom perhaps a fifth were idle, supported by the state, both fed and

amused at public expense. The same luxury and extravagance were found in the provinces, though in less degree. At no time in all history, until quite recently, have the masses enjoyed such comfort or such luxurious surroundings. Unfortunately this luxury and the general superficial prosperity which made it possible did not prevent the extinction of many of the upper-class and upper-middle-class families. The equestrian class grew, but only by adoption and recruitment from outside.

Economically, a kind of stagnation seems to have been increasing; the rich had most of the wealth, and lacked all incentive to increase it; the poor were content with "bread and circuses"; the middle class, in between, seemed satisfied with free public baths, public spectacles, free education, and the general security and opulence which surrounded them, and above all with the comparative freedom to pursue any religious cult or philosophy that attracted their attention or interest.

In the eastern provinces, manufacture was thriving, and the finished wares of Syria and Asia Minor were as well known in Rome as Egyptian grain and cotton goods. The port of Ostia was a thriving headquarters of Mediterranean trade, as its ruins prove; it had completely outstripped Puteoli (Pozzuoli), which was too remote for the transshipment of the vast cargoes of food and other supplies destined for the metropolis. Trade and transport were ubiquitous, and thus had an immense effect upon the spread and establishment of a worldwide common culture.

See also CHRISTIANITY; GREECE—*Ancient History and Culture: To 330* A.D.; LATIN LITERATURE; MEDITATIONS OF MARCUS AURELIUS; MIDDLE EAST—*Hebrew Civilization;* MIDDLE EAST—*Rome and Western Christianity;* ROMAN RELIGION; ROME—*History of Rome, City and State;* STOICISM; also historical and cultural sections of the various country articles and relevant biographies.

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PRINCIPAL EVENTS OF THE 2D CENTURY

101–106—Trajan's wars against the Dacians.

112—Dedication of the Forum of Trajan.

114–115—Annexation of Armenia and Mesopotamia (renounced in 117 by Hadrian).

116—Jewish revolt in Egypt, Cyrene, and Syria.

120–124—Pantheon constructed.

122–128—Hadrian's wall built across northern England.

132–135—Revolt of the Jews; final destruction of Jerusalem.

135—Temple of Venus and Rome dedicated.

139—Mausoleum of Hadrian dedicated.

152–153—Revolt in Egypt.

164—Destruction of Parthian capitals, Seleuceia and Ctesiphon.

165–166—Plague spreads from Parthia to the West.

167—Invasion of northern Italy by the barbarians.

169–175—War against the Germans and Sarmatians.

175—Revolt of Avidius Cassius in Syria.

196—Capture and sacking of Byzantium by Septimius Severus.

SECOND CONTINENTAL CONGRESS. See CONGRESS, CONTINENTAL.

SECOND EMPIRE. See FRANCE—*History: 1815–1914.*

SECOND INTERNATIONAL. See INTERNATIONAL.

SECOND WORLD WAR. See WORLD WAR II.

SECOND WORLD WAR, The, by Sir Winston S. Churchill, English statesman and writer. The six volumes of this history of World War II give a vivid, panoramic account of the struggle and its surrounding drama, as seen by a man uniquely placed to observe the course of events and in some degree to guide and direct them. A common moral links the separate books: "In War: Resolution; In Defeat: Defiance; In Victory: Magnanimity; In Peace: Good Will." Throughout the epic story Churchill pays tribute to the contribution of the United States to the liberation of the Old World from Nazi bondage, holding in particular esteem and affection President Franklin D. Roosevelt as leader and man, England's "great friend."

The Gathering Storm (London and New York 1948), the first volume of the series, covers the false peace following World War I, the rise of Hitler, the failure of appeasement, and the first engagements of World War II.

Their Finest Hour (1949), starting with Churchill as prime minister in 1940, traces the collapse of France and the heroic deliverance at Dunkirk. It reviews the stark years when England stood alone against the triumphant Nazi power and rose to new heights of heroism, inspired by Churchill's declaration that her people would fight on the beaches and in the streets but would never surrender.

The Grand Alliance (1950) deals with Germany's drive into the heart of Russia, the Battle of the Atlantic, the forging of the Atlantic Charter, the attack on Pearl Harbor, and the entrance of the United States into the war.

The Hinge of Fate (1950) unfolds a tale of disaster, with the Japanese sweeping down to Singapore while Field Marshal Erwin Rommel plays havoc in North Africa, followed by an equal period of magnificent successes: the British and American air strikes against Germany, the titanic Battle of Stalingrad, the Battle of Alamein, and the triumph of United States forces in the Coral Sea.

Closing the Ring (1951) begins with the summer of 1943 and depicts the ignominious end of Mussolini, the defeat of Italy, the Teheran Conference, and the Allied entry into Rome. It ends a year later, just before the immense armada of sea and air began to move across the English Channel to converge upon Normandy for the liberation of France and Europe.

Triumph and Tragedy (1953), the final vol-

ume, opens with the mighty assault of D-Day and follows the many-pronged attacks upon Germany until Hitler's suicide and Germany's unconditional surrender. It leaps across the world to tell of the atomic bombing of Japan and her capitulation shortly after. And finally it describes the melancholy events following the winning of the war: the shattered Russian promises after Yalta, the death of Roosevelt, and the repudiation of Churchill in the general election of 1945. The book ends on a tragic note as the nations of the world, far from peace, face even greater problems in an atmosphere envenomed by new hatreds.

SECONDARY EDUCATION. See EDUCATION, SECONDARY, IN AMERICA.

SECORD, sē'kôrd, **Laura,** Canadian heroine: b. Massachusetts, 1775; d. Chippawa, Ontario, Canada, Oct. 17, 1868. Following the Revolutionary War, she moved with her family to Canada. In 1813, overhearing plans by American troops billeted in her house for an attack on British forces at Beaver Dams, she hurried through the American lines to warn the British, who then surprised and routed the Americans.

SECRET SERVICE, United States.—A branch of the Treasury Department, the Secret Service is one of the oldest federal law enforcement agencies. Its duties are defined by law (Title 18, U.S. Code, sect. 3056), and they include the following:

(1) Protection of the person of the president of the United States; the members of his immediate family; the president-elect; and the vice president at his request.
(2) Suppression of the counterfeiting of the coinage, currency, stamps, and other obligations and securities of the United States.
(3) Suppression of the forgery and fraudulent negotiation of government checks, bonds, and other obligations or securities of the United States.
(4) Investigations relating to certain criminal violations of the Gold Reserve Act of 1934; the Silver Purchase Act; the Federal Deposit Insurance Act; the Federal Land Bank Act; the Federal Farm Loan Act; the Home Owners Loan Act; and the Government Losses-in-Shipment Act.
(5) Investigations pertaining to thefts of government property under control of the Treasury Department, as directed by the secretary of the treasury.

Prior to 1860, Congress had passed several laws to suppress counterfeiting, but it had not provided any funds to enforce those laws. The paper money in circulation was privately printed by individual banks in some 3,000 varying designs, and there was no standard federal paper money. When the act of Feb. 25, 1862, and that of June 3, 1864, authorized the issuance of United States notes and national bank notes, respectively, Congress acted to protect the new money against counterfeiting, and the Secret Service was established July 5, 1865, with William P. Wood as its first chief.

At that time there was no other general federal law enforcement agency, and it became the practice for governmental departments other than the Treasury Department to request the use of Secret Service agents to investigate various law violations. For example, in 1898 the Secret Service organized a counterespionage organization to combat and expose a Spanish spy ring operating in Canada against the United States during the Spanish-American War. Agents located the headquarters of the ring in Montreal, Canada, and exposed Lieut. Ramón Carranza, naval attaché of the Spanish legation, as its mastermind. Carranza was banished from Canadian soil by the Dominion government, and with the arrest of other spies in the United States, the Secret Service put an end to the Spanish spy system.

The most important duty of the Secret Service is the protection of the person of the president of the United States, which has been its responsibility since 1901. In that year President William McKinley was shot and killed at Buffalo, N. Y., the third president of the United States to meet death by assassination. When Theodore Roosevelt succeeded McKinley, he was protected by agents of the Secret Service, and in an appropriation act dated June 30, 1906, Congress provided funds for the protection of the person of the president by the Secret Service. On June 23, 1913, this protection was extended to the person of the president-elect and on June 12, 1917, provision was made to include the members of the president's immediate family. On July 16, 1951, Congress authorized the Secret Service to protect the vice president, "at his request."

Agents went to Panama with President Theodore Roosevelt, the first president to set foot on foreign soil while in office. Agents guarded President Woodrow Wilson during his European visit after World War I. They went to Alaska with President Warren G. Harding. They protected President Franklin D. Roosevelt during his trips to South America, Casablanca, Teheran, Cairo, Pearl Harbor, the Aleutian Islands, Canada, Mexico, and throughout the United States. They were with President Harry S. Truman during the famous Potsdam Conference, and in Canada and Mexico. They made advance preparations for President Dwight D. Eisenhower's historic journey to the Korean battle zone when Mr. Eisenhower was still president-elect, and safeguarded him while there. They remain with the president at all times, whether in the United States or abroad.

On May 14, 1930, the White House police force, organized in 1922 to protect the executive mansion and grounds, was placed under the supervision and control of the chief of the United States Secret Service.

Rulers of foreign countries and members of foreign missions in the United States were at one time protected by the Secret Service during their stay in this country. This duty was subsequently transferred to a newly organized security division of the Department of State.

Law enforcement activities of the Secret Service have been many and varied. During the Civil War, one of the most extensive legal lotteries in the world was organized in New Orleans. Known as the Louisiana Lottery, it received in cash some $300 million, of which only a small portion was paid out in prizes. Through the manipulation of numbers and other crooked practices, many of the lottery owners became multimillionaires. In 1902 the Department of Justice borrowed Secret Service agents who were assigned to suppress the lottery activities, and from 1902 to 1908 the agents made numerous arrests and seizures, which finally ended the enterprise.

By 1905, at the request of the attorney general of the United States, some 32 Secret Service agents were lent to the Department of Justice to investigate extensive frauds against the government, especially frauds resulting from passage of

the Homestead Act of 1862, which threw free lands open to homesteaders. Many of the Western cattle barons used dummy entrymen to gain rich grazing lands for their herds, and other unscrupulous landowners claimed land for agricultural purposes, but actually robbed it of coal, oil, and timber. Secret Service agents exposed numerous land frauds and recovered millions of acres for the government. Congress in 1907 restricted the work of the Secret Service to its normal Treasury Department duties and prohibited the loaning of its agents to other governmental units. Several Secret Service agents were then permanently transferred to the Department of Justice and other governmental departments and formed the nuclei around which subsequent investigative units were established.

The restrictions imposed upon the Secret Service by Congress were temporarily lifted on May 14, 1915, when President Woodrow Wilson directed Secretary of the Treasury William G. McAdoo to use the Secret Service to uncover violations of neutrality. One of the most startling incidents of the World War I followed this assignment. Secret Service agents in New York City on July 24, 1915, shadowed George Sylvester Viereck and Dr. Heinrich Albert, both of whom were active German propagandists in the United States. At the 50th Street station of the Sixth Avenue elevated line, Dr. Albert left his seat and momentarily forgot a brief case which he had been zealously guarding. Instantly, Frank Burke, the Secret Service agent watching Albert, seized the case and left the train. Agent Burke was pursued by Albert but cleverly eluded him. The brief case was delivered to Secretary McAdoo. Its contents proved that Germany was deliberately violating the neutrality of the United States; that German agents had completed elaborate schemes to influence public opinion by buying newspapers and establishing news services; and that a periodical called *The Fatherland,* edited by George Sylvester Viereck, was on the German payroll for $1,500 a month. The German government, according to the seized papers, planned to organize strikes in American munitions plants; to corner the supply of liquid chlorine, used for poison gas; to acquire the Wright Aeroplane Company and its patents and use them in German interests; to cut off from England the supply of cotton and make it appear that the stoppage had originated spontaneously among the Southern cotton growers. It was disclosed that Germany, through its agents, had actually purchased a large munitions plant at Bridgeport, Conn., the ownership of which was concealed under an assumed name. Orders for shells were received from Great Britain and Russia, but the Germans never intended to make deliveries. The Albert papers were published in the New York *World* by permission of Secretary McAdoo, but the facts surrounding seizure of the brief case were not made public until 1931, when they were included in McAdoo's autobiography *Crowded Years.*

Secret Service agents were also active in investigating the Teapot Dome oil scandals. In 1915, President Wilson designated an area in Wyoming, embracing about 9,481 acres of oil land known as Teapot Dome, as a naval oil reserve. Subsequently, Congress discovered that a lease of the entire reserve had been executed April 7, 1922, to the Mammoth Oil Company, without competitive bidding. More irregularities affecting other oil lands were then unearthed, and Congress directed the president to cancel leases of oil contracts and to appoint special counsel to conduct necessary litigation and prosecution.

At the suggestion of President Coolidge, the special counsel enlisted the cooperation of the United States Secret Service. Its agents were assigned to the investigation of the oil scandals and worked for about three years before their association with the investigation became generally known. The intensive efforts of the government resulted in several convictions and the collection by the government of several million dollars in taxes, penalties, and interest.

In its work of suppressing counterfeiting, the Secret Service is constantly active. The volume of counterfeit money circulated in the United States has fluctuated widely through the years. The peak appears to have been reached in the middle 1930's, when several large gangs organized extensive operations from plants set up in the eastern part of the nation. The destruction of these gangs by the Secret Service and the conviction and imprisonment of scores of the counterfeiters and passers brought a prompt and drastic reduction in bogus money losses to the public. Supplementing its enforcement methods, the Secret Service uses crime prevention methods to keep counterfeiting down. Its agents show handlers of money, including the general public, how to distinguish the genuine from the counterfeit. Special training has been brought to bank employees and other commercial handlers of cash, and an effective system for quick dissemination to such agencies of warning notices and details of new counterfeits as they appear has been an integral part of this crime prevention program. In addition, under the slogan, "KNOW YOUR MONEY," instruction in the detection of counterfeits has been carried to the public through the high schools of the country and through motion pictures, radio, lectures, and newspaper and magazine articles.

Similar preventive methods supplement the enforcement work of the Secret Service in the suppression of forgery of government checks, more than 300 million of which are issued annually. As the result of Secret Service recommendations, these checks bear the pertinent warning "KNOW YOUR ENDORSER—REQUIRE IDENTIFICATION." This warning is the basis of the Secret Service efforts to prevent forgery, by cautioning merchants and other potential victims of the forger to establish to their complete satisfaction the identities of strangers who present checks for payment.

The chief of the United States Secret Service supervises and directs its field and departmental forces, the White House police force, and the Treasury guard force which protects the Treasury Building and vaults. The men appointed as chiefs of the Secret Service and their terms of office since its establishment have been:

William P. Wood	1865–1869
Herman C. Whitley	1869–1874
Elmer Washburn	1874–1876
James Brooks	1876–1888
John S. Bell	1888–1890
A. L. Drummond	1891–1894
William P. Hazen	1894–1898
John E. Wilkie	1898–1911
William J. Flynn	1912–1917
William H. Moran	1917–1936
Frank J. Wilson	1937–1946
James J. Maloney	1947–1948
U. E. Baughman	1948–

The Secret Service has 57 field offices throughout the United States and in Hawaii and Puerto Rico. Each office is under the direction of a special agent in charge, who reports directly to the chief. However, for administrative purposes the chief has divided the country in four regions, each under the supervision of a regional inspector with headquarters in Washington. At least once annually each field office is thoroughly inspected by an inspector, who thus maintains a close liaison between the chief and the special agents in charge.

Special agents of the Secret Service are appointed under rules of the United States Civil Service Commission and must pass the examination prescribed by the commission. Their training includes not only on-the-job instruction, but also intensive courses in special Treasury and Secret Service schools, where the agents are educated in such subjects as the expert use of weapons, *modus operandi* of counterfeiters and forgers, study of the manufacture of paper money and coins, the principles of protection, the handling of bombs and explosives, interrogation, shadowing, and other phases of modern law enforcement.

The chief of the Secret Service, each special agent in charge, and each special agent carries an engraved silver badge in the shape of a five-pointed star with the inscription "U.S. Secret Service" in the center portion. In addition, he carries a commission which bears his photograph, printed name, title and signature, together with the signature of the chief. The commission is mounted in a fabricated case, the outer cover of which bears an embossed gold reproduction of the Secret Service badge.

See also COUNTERFEITING.

U. E. BAUGHMAN,
Chief, U.S. Secret Service.

SECRET SOCIETIES have existed in all ages known to history and among all classes of mankind, except, perhaps, savages of the most primitive type. Such societies generally have clearly formulated purposes, with secret established procedures of initiation and ritual and with secret and overt signs and symbols. Although occasionally such societies admit both sexes, they have usually been limited to one sex, and secret societies for men have been more common than those restricted to women.

In the ancient world secret societies were chiefly religious, or at least professedly so, but in ancient times religious and temporal power were so closely associated that it was difficult, if not impossible, to draw a dividing line. There were the mysteries of Osiris and Serapis in Egypt, of Orpheus and Dionysus in Greece, of Cybele in Phrygia, and of Mithras in Persia, all of which tended to surround the worship of the gods with elements of secrecy and awe, which appealed to the conscience and imagination of men, and helped to keep the ignorant multitude in submission to the hierarchy and all that it represented.

In the Middle Ages the secret courts of Westphalia were practically vigilance committees, bound to secrecy by the very object of their existence. The Knights Templars were a secret order, although there is no trustworthy evidence that they were guilty of the practices alleged against them as a ground for suppression of the order and seizure of its wealth.

The Freemasons originated in the combinations formed by operative masons in the Middle Ages for self-protection while they were building cathedrals and other great structures. It is generally believed by students of antiquity that the origin of the order rests on a still more ancient body from which it sprung. (See also MASONIC FRATERNITY.)

The secret societies which have arisen within the 19th and 20th centuries have been chiefly political and benevolent. The struggle for freedom in Italy gave birth to powerful secret organizations, which continued to exist after Italian unity had been gained, and have caused, at times, much anxiety to the authorities. Ireland has also had a large number of secret political societies, including the United Irishmen, the Fenians, the Orangemen (qq.v.), and other orders of the past and present. In Russia the revolutionary society known as Nihilists (see NIHILISM) slew one czar and was an ever-present menace to autocratic government. In China secret societies have pervaded every class of the population; one of them, known as the Boxers (q.v.), caused the attack on the legations at Peking which provoked an international armed force to severe reprisals.

Modern secret societies in the United States have divided naturally into groups. Some have been concerned with political or semipolitical movements, as the Knights of Labor; others have been of religious character, as the Rosicrucians, and various alliances and leagues within the several denominations; others have fostered temperance or some moral issue, as the Good Templars; others have been fraternal, with important insurance features, as the Odd Fellows and Eagles; others have been approximately fraternal, as the Greek letter societies of the colleges; others have grown out of the trade alliances, as the ancient guilds and the modern trade union organizations.

The famous Tammany Society of New York, less generally known as the Columbian Order, dates from 1789, being only a fortnight younger than the republic itself. It was based on an earlier secret society, one of those bodies that had to be conducted largely in secret, which helped to develop the spirit that culminated in the American Revolution. Tammany is now wholly a political body within the Democratic Party. (See also TAMMANY HALL.) The Improved Order of Red Men (q.v.) developed from the same parent stock as Tammany, but along radically different lines of fraternity.

A notable development of the semipolitical secret society was the revival, in 1915, of the Ku Klux Klan (q.v.). While this movement started, and had its greatest strength in the South, its chief activities were not directed against Negroes, as in the case of its forerunner, but rather against Roman Catholics, Jews, and the foreign born. The organization gained great power in the southern and western states, and was a strong force even in the East. It was able to dictate nominations and elections in many cases. Its strength was greatest from 1922 to 1926. Dissensions in the body and revelations of corruption in politics, especially in Indiana in 1927, led to a weakening of its influence throughout the United States.

Of societies with evil purposes, the most noted has been the Mafia (q.v.), of Italy, which is said to have been introduced into the United

States with the large Italian immigration, and to which many crimes have been ascribed. The Molly Maguires were a society in the Pennsylvania coal regions, organized for the objects of terrorism and murder. It was suppressed by the State, and the leaders were executed. Consult Byrum, R. R., 'Secret Societies' (New York 1921); Lepper, J. H., 'Famous Secret Societies' (London 1932); Preuss, A., 'Dictionary of Secret and Other Societies' (Saint Louis 1924); Webster, N. H., 'Secret Societies and Subversive Movements' (New York 1925). See Societies, Criminal, and other secret societies under their respective titles.

SECRET SOCIETIES, College. See Greek Letter Societies.

SECRETARIAL EDUCATION. The distinction between the secretary and the stenographer is not sharp. The duties of the two frequently shade the one into the other. The stenographer of course has distinctive abilities. He knows some system of shorthand, he is a typist and he can transcribe his shorthand notes on the typewriter. The secretary, on the other hand, while he will find these abilities of the stenographer useful, will find that they are only a small beginning of what he needs. In fact the secretarial range of usefulness is very wide, too wide to be wholly comprehended in a single course of training. It is advisable to consider secretarial education under two heads, general or preparatory education and technical or special education.

Whether we have in mind the general or technical training it is necessary to classify the secretarial work. We may distinguish between the private or personal secretary and the institutional or organization secretary. The latter is a person who records the minutes of meetings of boards of trustees, boards of directors, committees, etc. This type of secretary needs very little technical training but should have a good general education. The private or personal secretary may be a social, educational, literary, political, ecclesiastical or business secretary, according as he serves a person engaged in any of these professions or occupations. The word secretary has its best application only in this sense, signifying a person who has charge of the *secreta* (secrets) of his employer.

Secretarial education presupposes a thorough high school or other secondary school course. After this preparatory training follows a liberal education with major emphasis on the particular field in view. The prospective social secretary gives major emphasis to philanthropy, history, art, literature. The prospective educational secretary centres his major interest on comparative education, educational administration, the philosophy of education, history of education, etc. The literary secretary must have literary taste, a knowledge of style and a wide acquaintance with the world's best literature. The political secretary will need thorough acquaintance with history, economics, sociology, law, etc. The ecclesiastical secretary must add to a liberal education a knowledge of church polity. The business secretary must lay emphasis on economics, geography, industrial history, commercial law, accounting, sociology and psychology. It is clear that the best results can be obtained only when the general education has consciously aimed at the particular field in which the secretarial duties are to be performed. Without such general education the secretary remains merely a clerk or a stenographer.

Secretarial education in its technical or specialized form should, therefore, be assigned to the last two years of the regular college course or, preferably, it should be a graduate course. With collegiate courses as a background, this technical training can be given in one or two years. It should offer the following features: Applied psychology, correspondence, business organizations, office management, filing systems, publicity methods, library methods, including cataloguing, business law, finance, stenography, typewriting.

History of Secretarial Education.— Business colleges have undertaken the training of secretaries but they have been unable to command the best standards of preparation or of training. They admit as students persons who have had less than a grammar school education. Their product is, therefore, defective in the use of English, frequently inaccurate in the use of ordinary office machinery, and wholly unprepared for the secretaryship as outlined above. The best business college product furnishes good material for stenographers.

High school commercial departments are rapidly entering this field. Their entrance requirements are higher and they give a broader training in language, history, science, etc., but they often fall short of thoroughness in the mechanics. That is, they give insufficient time to secure the necessary speed and accuracy in stenography and typewriting. The high school commercial product at its best approaches a secretarial standard but falls far short of the best conception of the secretaryship.

Both the business college and the high school commercial department are temporary means for meeting an ill-defined need. As the secretarial definition becomes clarified, the demand grows for a higher type of training. Colleges are adding secretarial courses and several universities are offering advanced courses in Business Administration. Among them are Simmons College, Harvard, Yale, New York University and others. A typical undergraduate secretarial college course is the following: *Freshman year:* English, French, German, history, hygiene, physics, filing. *Sophomore year:* English, French, German, history, penmanship, stenography, typewriting. *Junior year:* Business law, economics, English, stenography, typewriting, French, German, history, sociology. *Senior year:* Accounts, business methods, commerce, commercial teaching, economics, education, English, French, German, government, history, sociology, Spanish. A typical graduate course, open only to students who have already earned the bachelor's degree, is the following: Accounts, administration, business practice, stenography, typewriting, business law, library practice, commerce.

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SECRETARY-BIRD, or SERPENT EAGLE, a remarkable raptorial bird (*Serpentarius secretarius*) of South Africa, representing alone the family *Serpentariidæ*, associated

with the vultures. The general aspect of the bird is that of a long-winged, long-tailed, gray-and-black hawk mounted upon very long legs, so that as it stalks across a plain it might easily be mistaken for a crane. It runs with the speed of a horse and will fly when forced to do so, and may soar to a considerable height. It builds a big substantial nest in some bush or tree and reoccupies it from year to year. Their food consists of small animals and reptiles of all sorts, and especially of snakes, which it kills with a powerful forward kick, or, if the first stroke is not effective, repeats it with feet and knobbed wings, actively dodging the serpent's lunges, until the reptile is disabled or dead. These birds are frequently tamed and kept about the farmyard in South Africa as vermin destroyers. They take their name from the tufts of erectile feathers growing on each side of the head, which suggest a bunch of pens stuck behind a clerk's ear; the Arab name means «thirty ears.» Consult Evans, 'Birds' (New York 1900).

SECRETARY OF STATE, an officer whose business is to superintend and manage the affairs of a particular department of government. In the United States the Secretary of State has entire charge of foreign affairs, consular agencies and diplomatic matters. He is a member of the President's Cabinet and is usually considered the principal adviser to the chief executive. In Great Britain there are seven secretaries of state: for the Home, Foreign, Dominion, Colonial, War, Indian and Air departments. The Secretary of State for the Home Department has charge of the privy signet office; he is responsible for the internal administration of justice, the maintenance of peace in the country, the supervision of prisons, police, sanitary affairs, etc. The Secretary of Foreign Affairs conducts all correspondence with foreign states, negotiates treaties, appoints ambassadors, etc. The Dominion and Colonial Secretaries perform for their dependencies similar functions to those of the Home Secretary for the United Kingdom. The Secretary for War, assisted by the commander-in-chief, has the whole control of the army. The Secretary for India governs the affairs of that country with the assistance of a council. The Secretary of State for Air has supervision of all the governmental activities relating to aviation and its development. Each secretary of state is assisted by two under-secretaries, one permanent and the other connected with the administration, with numerous subordinates. There is no longer a chief secretary for Ireland. In 1885 the office of Secretary for Scotland was revived; he exercises in Scotland many of the powers and duties of the secretary for the home department, but has no cabinet rank by virtue of his office. The Secretary to the Admiralty is a subordinate member of the government, always a member of the House of Commons, in which he represents the Admiralty when the First Lord of the Admiralty is a peer. A secretary of embassy, or of legation, is the principal assistant of an ambassador or envoy.

SECRETION, the process whereby certain structures — glands or membranes — elaborate, separate or secrete, from the common medium presented by the blood, definite and specialized products destined either for use in the economy of the body, or for being sent out of the organism. In this way the process of secretion subserves a double function, or exhibits a double aspect, inasmuch as it not only manufactures products for home consumption, as it were, but provides also for the removal of waste matters from the body. Substances or products elaborated for the use of the organism are named secretions. Products secreted only to be discharged from the organism are called excretions. Take the liver and its bile as an example of a true secretion destined — primarily, at any rate — for use in the body, that is to say, in the process of digestion and elaboration of food; then as an illustration of the excretory form of the process, observe the kidneys and their secretions, these organs secreting from the blood urea, carbonic acid and other products which, in the form of urine, are destined to be discharged sooner or later from the body. The work of secretion is thus primarily seen to be among the most important of those actions the perfect performance of which contributes to the welfare of the organism; and interruption to the secretory processes results necessarily in the induction of disease of more or less serious kind. As both secretions and excretions are poured out from the secreting organ either upon the outer surface of the body or into some of its internal channels or ducts, it would appear that the two processes are identical in their ultimate aims and ends.

But true secretions (for example, bile and milk) consist of substances or compounds which, as such, do not exist in the blood, but demand a process of elaboration in the glands or secreting structures for their due and perfect formation. Excretions, such as the urine, consist of substances which exist in the blood in a form somewhat related to the final product. The elements are collected and thrown out more or less as such. Secretions exist *potentially* in the blood, and require for their elaboration definite and special structures. Excretions actually exist in the blood, and demand for their elimination and separation processes more analogous to mere filtering, and less complicated than those demanded by the work of secretion. This latter distinction receives practical confirmation and support from the fact that when excretions are checked in their natural discharge they may appear in their characteristic form in the blood. This result is well seen in cases of suppression of urine through disease or injury of the kidneys. But if true secretions be checked they cannot, under the same or ordinary circumstances, be detected in the blood; and removal of the secreting organ forever prevents the reappearance of the secretion. A pent-up secretion may be reabsorbed by the blood, and be detected in that medium, but this does not affect the grand distinction to be drawn between the actual nature of and differences between the two processes.

The essential structural characters of a secreting surface consist, firstly, of a structureless primary or basement membrane; secondly, of blood-vessels, which bring the blood from which the secretion is elaborated; and lastly, of cells or special structures devoted to the further elaboration of the constituents derived from the blood. A simple membrane, such as a serous or mucous membrane, exhibits the ar-

rangement of these elementary parts in its simplest phase; while more complicated arrangements of the same essential parts result in the formation of the more definite secreting parts which we term glands. Of these structures, in themselves constituting most of the chief organs or viscera of the body, three great plans may be distinguished, so far as the arrangement of their elementary parts is concerned. Thus the simple tubular glands — well exemplified in the tubular follicles of mucous membranes, in the gastric follicles or glands of the stomach, in the sweat or sudoriparous glands of the skin, etc.— consist of simple tubular involutions or depressions of the membrane which forms them, or with which they are connected. Each consists, therefore, of an open and elongated pouch or vesicle, the wall of which is composed of the primary membrane, while its lining is formed of secreting cells. This primary and elementary form of glands may be complicated by presenting a saccular rather than a merely tubular form, or by having the simple tube developed in a coiled form. The aggregated or conglomerate glands form the second division of gland structures. Such are the true mucous glands of the membranes of that name, the salivary and mammary glands, the prostate gland and the pancreas or sweetbread. These glands exhibit an essential structure composed of rounded clusters of vesicles termed acini, grouped together in various ways, which contain gland-cells, and which open by minute ducts gradually uniting to form the main duct of the gland. These acini or vesicles, as before, are lined by secreting cells. The third variety of glandular structures is that comprised in the idea of convoluted tubular glands. The kidney and the testicle exemplify this latter class of structures. In these glands we find tubules of basement membrane of generally uniform size, presenting a convoluted appearance, and terminating either in blind pocket-like extremities or by dilatations, as seen in the Malpighian corpuscles. (See Kidneys.) Sometimes, however, such tubular structures may, as in the testicle, form a loop, and then return along their original course. The tubules are lined by their secreting cells, and in their tortuosity evince a structure which presents a large secreting surface frequently comprised within a very small space or extent.

The exact means or rationale whereby each gland is enabled, from the common medium furnished to all, to elaborate through its own special cells its characteristic secretion, presents a problem from the perfect solution of which physiological science seems as yet far off. The cells of the liver contain bile; those of the mammary gland contain the fatty particles of the milk; and those of the testicle spermatozooids. But it can only be said that cells secrete; of the origin of these secreting powers and of the exact manner in which they are exercised nothing is known; yet that some acute and distinct specialization of the powers of secreting or gland-cells takes place over those of other and ordinary cells there can be no doubt whatever.

The view that secretion and the great process of nutrition (q.v.), to which secretion ministers, are identical is a reasonable and thoroughly consistent opinion. Viewed as mere organs, and apart from all purely functional considerations, the structure and formation of secreting glands might be regarded as simply processes of pure nutrition.

The greater the vascularity or blood-supply sent or distributed to any secreting organ the greater generally are its secreting powers. But the rate of circulation through a gland, or the mere quantity of the blood itself, cannot be shown to exert any direct influence on its secretory powers. Secretions may be retained for a lengthened period in some glands — such as the testicle — which are only periodically active, or they may be almost continually discharged, as is the case with the secretion of the kidneys. Under stimulation most if not all glands secrete more rapidly and abundantly, but the nature of the stimulation varies in different cases, or may be either of normal or abnormal kind. The discharge of secretions is effected by pressure from behind, while occasionally, as in the ureters and bile-ducts, the pressure of muscular fibres aids in the expulsion of secretions. The particular quality of blood may affect secretion, as at certain times a greater quantity of a particular material may be contained in the blood, the presence of this material stimulating the action of some appropriate gland.

The influence of the nervous system is important in connection with the general conditions of secretion, but much belonging to this topic exists in a still obscure state. It is known, however, that by regulating the supply of blood to a gland the nervous system may indirectly operate in preventing or forwarding the work of any gland, and that through the agency of conditions acting upon the nervous centres and upon the vegetative nervous system, effects are respectively wrought upon the glands. Food in the mouth induces a reflex action (q.v.), which action, produced through impressions made on nerve centres and reflected to the nerves of the salivary glands (q.v.) induces a copious flow of saliva through the stimulation of the glands. Mental conditions alone, and without material stimuli, will excite secretion, as seen in the flow of tears, or in the flow of saliva following the description of dainties; while the sudden stoppage of the milk secretion through fear or sorrow affords an illustration of the same fact. One secreting surface or gland bearing a functional relation to another gland (for example, kidneys and skin) may, through diminished or increased action, affect that other. Consult Bayliss, 'Principles of General Physiology' (2d ed., 1918).

SECTOR (Latin, *seco,* to cut), denotes in geometry that portion of the area of a circle included between two radii and an arc; or, a mixed triangle formed by the radii mentioned and the arc of a circle. Thus *A B C* contained within the radii *C A, C B,* and the arc *A B* is a sector of the circle of which the arc *A B* is a portion. The area of a circular sector is equal to the product of the arc of the sector by one-half of the radius. If the angle at the centre is given, the length of the arc of the sector may be found, since it is equal to π multiplied by the radius into the ratio of 180 degrees to the number of degrees of the sector. Thus:—

$S = \pi r \frac{n^\circ}{180^\circ}$, and $A = \pi r \frac{2n^\circ}{360^\circ}$,

for the area.

A spherical sector (the one just described is a circular sector) is a volume or solid that may be generated by revolving a circular sector about a straight line drawn through the vertex of the sector as an axis. The arc of the spherical sector generated the surface of a zone called the base of the spherical sector and the two radii generate the surfaces of the two cones, having a common vertex at the centre of the sphere. The *volume* of the spherical sector is equal to the zone which forms its base, multiplied by one-third of the radius of the sector.

Sector is also used as the name of an instrument employed in practical mechanics. It is sometimes called the sectorial scale of equal parts. It is usually a scale of wood, brass or ivory, consisting of two arms which open by turning round a joint or hinge at their common extremity. On each arm there is a diagonal line drawn through the point about which the arms revolve. These are divided into equal parts, which are numbered from the common point outwards.

The sectorial scale is so marked with lines of sines, tangents, secants, chords, etc., as to fit all radii and scales, and is useful in making diagrams: laying down plans, etc. Its principal advantage consists in the facility with which it gives a graphical determination of proportional quantities. It becomes incorrect comparatively, when the opening is great, or the result greater than the data. The sector is founded on the fourth proposition of the sixth book of Euclid, where it is proved that equiangular triangles have their homologous sides proportional.

This instrument is said to have been invented by Guido Uvaldi about 1568, though Gaspar Mordente of Antwerp describing it in 1584, attributes its invention to his brother Fabricius in 1554. It was described by several German and English writers in the same century, and again by Galileo, who claimed to have invented it in 1604. Frenchmen call it the compass of proportion.

Another instrument, used in astronomical observation, is called sector. A limb of this instrument embraces only a portion of a circle used for measuring differences of declination too great for the compass of a micrometer. This instrument was contrived for the purpose of measuring with great accuracy the zenith distances of stars, and when it is so employed it is called a zenith sector. It was by means of the zenith sector that Bradley discovered the existence and magnitude of two very important astronomical elements — the aberration of light, and the nutation of the earth's axis. The instrument has been at times used in trigonometrical surveys for determining the difference of latitude between two stations. For the difference of the zenith distances of the same star, observed at its meridianal passages at two places, gives the difference of the astronomical latitudes of such places without any regard to the star's declination.

There is yet another way in which the word sector is used. It sometimes denotes an arc-shaped attachment to an equatorial mounting often used for communicating the motion of the driving clock to the polar axis. A driving clock, obiter dicta, is a powerful and accurate clock motion used in astronomical and physical investigations to turn an equatorial telescope round its polar axis, so as to hold an object fixed in the field of view; or, for driving a chronograph or other instrument.

SECTS, Religious. See Religious Sects.

SECULAR GAMES, in Roman history, games celebrated at long and irregular intervals, and not, as their name would seem to indicate, once every century. Under the republic they were known as the Tarentine games, from a place in the Campus Martius, called Tarentum, where they were celebrated, and appear to have been instituted about the time of the consul Valerius Publicola. Nothing is known of their origin beyond the fact that they were celebrated in honor of Pluto and Proserpina for the purpose of averting from the state some great calamity. Under Augustus they were revived in 17 B.C. with considerable pomp, occupying three days and nights, and being accompanied by sacrifices to Jupiter, Juno and all the superior deities. For this occasion Horace wrote his 'Carmen Sæculare' in honor of Apollo and Diana, sung by a chorus of youths and virgins. The secular games were celebrated on subse quent occasions, namely, in the reign of Claudius in 47 A.D., in that of Domitian in 88, and in that of Philip in 248, exactly 1,000 years after the building of Rome.

SECULARISM, an ethical system founded on the principles of natural morality and independent of revealed religion or supernaturalism. Its first postulate is freedom of thought — the right of every man to think for himself: this is now admitted, at least in theory, by most Christians; but it was not so when the platform of Secularism was first promulgated about the year 1846 by George Jacob Holyoake in England. Implied in this postulate as its necessary complement is the right to difference of opinion upon all subjects of thought. And this right would be nugatory without the right to assert that difference. Finally, Secularism asserts the right to discuss and debate all vital questions, such as the commonly received opinions regarding the foundations of moral obligation, the existence of God, the immortality of the soul, the authority of conscience, etc. Secularism does not maintain that there is no other good but the good of the present life: with that question it does not meddle: but it does maintain that the good of the present life is a real good, and to seek that is good; and it aims to find "that material condition in which it shall be impossible for man to be deprived or to be poor." In this life there are, it asserts, material agencies which cannot be neglected without folly or hurt, and that it is "wisdom, mercy and duty to attend to them." It does not combat the pretensions of Christianity; does not say there is no light or guidance save in nature; but maintains that "there is light and guidance in secular truth, whose conditions and sanctions exist independently, act independently, and act for ever."

SECULARISTS. See Religious Sects.

SECURITIES AND EXCHANGE COMMISSION (SEC), The, a federal agency responsible for administration of the following laws designed for the protection of the investing public: Securities Act of 1933; Securities Exchange Act of 1934; Public Utility Holding Company Act of 1935; Trust Indenture Act of 1939; Investment Company Act of 1940; and Investment Advisers Act of 1940. The commission also serves as adviser to federal courts in corporate reorganization proceedings under chapter 10 of the National Bankruptcy Act.

The commission is composed of five members appointed by the president with the advice and consent of the Senate, not more than three of whom may be of the same political party. They serve for five-year staggered terms.

The Securities Act requires the prior registration with the commission of securities offered for public sale. The purpose of registration is to provide disclosure of financial and other information concerning such securities on which an investor may make an informed judgment as to their worth. To that end, a prospectus containing the pertinent disclosures must be furnished prospective investors. Indentures under which large debt issues are issued must also be qualified under the Trust Indenture Act.

The Securities Exchange Act requires similar disclosures in respect of securities listed for public trading on our national securities exchanges. Issuers of such securities also must make certain minimum disclosures in the solicitation of proxies from the holders of listed securities; and management officials as well as large stockholders must report their stock holdings and transactions and may be accountable to the company for short-term trading profits therein.

The securities laws prohibit misrepresentation, manipulation and other fraudulent acts and practices, and empower the commission to investigate securities violations and enforce statutory sanctions. The Securities Exchange Act also provides a system for regulation of the trading practices on the exchange and over-the-counter markets, designed to establish and maintain just and equitable principles of trade. As an incident thereto, national securities exchanges and over-the-counter brokers and dealers must register with the commission and conform their business practices to prescribed standards designed for the protection of investors. Securities violations may lead to injunction or criminal prosecution or, in the case of brokers and dealers, revocation of registration.

The Public Utility Holding Company Act of 1935 provides for special regulation of financial and related practices of electric and gas utility holding company systems (and calls for integration of their properties and simplification of their corporate structures); while the Investment Company and Investment Advisers acts provide for special regulation of the activities of investment companies and investment advisers.

SEDALIA, city, Missouri, and Pettis County seat; altitude 907 feet; 185 miles west of St. Louis, 98 miles southeast of Kansas City; on the Missouri Pacific; and the Missouri-Kansas-Texas railroads. Located at the center of its county, and a little to the west of the center of the state, Sedalia is the focal point for several divisions of the railroads that serve it with freight and passenger transportation, and is important as shipping and distributing center for an extensive productive area surrounding the city. Large railroad shops are located here, employing many of the city's workers.

Situated in the midst of an agricultural region in which corn, wheat, and oats are the principal crops, Sedalia has a list of industrial activities which includes the processing of dairy and creamery products; with a schedule of manufactures that carries such items as disinfectants, work clothes, brooms, glass blocks, prefabricated houses, trailers, shoes, and mattresses. Besides the railroad shops there are, in the heavier industries, flour mills, packing plants, and bottling works.

There are excellent public and parochial schools, and a Carnegie Library. Musical organizations include a men's choral club and a symphony orchestra. Prominent among the buildings of the city are the Courthouse, City Hall and Armory; the library, banks, churches, and the state fair buildings. The Missouri State Fair is held here annually, in August, under the supervision of the State Department of Agriculture.

History.—First permanent settlement on the Sedalia site was made in 1860. The land, held by Gen. George R. Smith, a resident of the county, having been acquired by him in 1856, was set aside for development in anticipation of the coming of the railroad. In 1857 a plat of the proposed town was filed; with more heed for geometrical precision than for the possible civic requirements of the future, it was laid out in a square. It is said the founder first settled upon the name Sedville, and later changed it to its present form. The first passenger train came in 1861, the year after settlers had established themselves. The westward advance of the railroad was delayed after the outbreak of the Civil War, and for several years Sedalia was its western terminus. During the entire period of the Civil War, Sedalia became a military post, which it remained until the latter part of 1864. The town was held by the North, except for a single day when raiding Confederate forces had possession of it; Union forces under command of Gen. A. J. Smith recovered the city. In 1861, when operations in Missouri were under way, Gen. Nathaniel Lyon and Gen. John C. Fremont fitted out forces at Sedalia. After the war years the extension of the railroads brought to Sedalia a commercial activity that has endured. Sedalia became county seat in 1864, replacing the original seat of Georgetown. It was chartered as a city in 1889. The city has government by mayor and council. In 1880 the population was 9,561; in 1890, 14,068. Pop. (1940) 20,428; (1950) 20,269.

SEDAN, sē-dăn′, town, France, in the Department of Ardennes, near the Belgium frontier, on the Meuse River, 11 miles east-southeast of Mézières, and about 160 miles northeast of Paris. Its principal buildings are the theater, public library, and college. The town has important cloth manufactures, employing the majority of the inhabitants. Its chief interest is connected with the defeat of the French Army by the Germans, and the surrender of Napoleon III with 100,000 soldiers, Sept. 2, 1870. During the final campaign of World War I, American troops occupied the heights dominating the city on Nov. 6-7, 1918, but for sentimental reasons it was placed within the French area, so that they should be the first to enter the town. In World War II it was

taken by the Germans in May 1940 and held until retaken by Americans in August 1944. Pop. (1946) 18,359.

SEDAN, sē-dăn', or **SEDAN CHAIR.** A portable chair, cushioned and decorated, used as a vehicle for carrying one person who sits within it, the enclosure being therefore of much greater height than width. It is carried on two poles which pass through rings secured to the sides, usually by two bearers. They were introduced in western Europe in the 16th century, but their use was extended greatly in the 18th century, when they were the common means of transportation for ladies and gentlemen in England and France. Similar chairs carried on the shoulders of two or more bearers have been long in use in China.

SEDDON, sĕd"n, **James Alexander,** American statesman: b. Falmouth, Va., July 13, 1815; d. Goochland County, Va., Aug. 19, 1880. He was graduated from the law school of the University of Virginia and practiced law in Richmond. He was a Democratic member of Congress 1845–1847 and 1849–1851, after which he retired to his estate. In February 1861 he was one of five delegates to the "Peace Congress" at Washington, where he maintained the right of a state to peaceful secession. In July 1861 he was a delegate from Virginia to the Confederate provisional congress, and in November 1862 became secretary of war in the Confederate Cabinet. This position he held until the Civil War was nearly over, resigning Jan. 28, 1865, and retiring from public life.

SEDDON, Richard John, New Zealand premier: b. Eccleston, Lancashire, England, June 22, 1845; d. at sea, June 10, 1906. Emigrating to Australia at 18 he was attracted to New Zealand four years later by the gold discoveries. He sat in the New Zealand Parliament in 1879–1881 and 1881–1890; later he became minister for defense and public works, commissioner of trades and customs, and finally rose to be premier. By profession he was a mining engineer, and he was an associate of the American Institute of Mining Engineers. He was the body and the soul of the New Zealand government.

SEDGE, a common term indiscriminately applied to the many marshy plants of the family Cyperaceae, and particularly to the genera *Cyperus* and *Carex*. The sedges are grasslike or rushlike herbs with slender stems, generally solid, often triangular, and but rarely swollen at the nodes. The leaves are pointed and narrow (the word "sedge" refers to their cutting edges), with closed sheaths, with or without reduced ligules, and are three-ranked. The flowers are either perfect or otherwise, and are very small, having a hypogynous perianth, generally consisting merely of bristles or scales, with from one to several stamens having slender filaments, and a simple, toothed or cleft style. The fruits are one-celled and are lenticular or three-cornered. The tiny grasslike flowers are gathered into spikelets of one or more, each (or rarely a pair) in the axil of a scale, which may be persistent or deciduous; the spikelets are themselves arranged in various inflorescences, often in conspicuous umbels. The sedges frequent marshy lands, chiefly, and are occasionally useful in binding sea-sands or in contributing to the growth of peat-bogs.

SEDGWICK, Adam, English geologist: b. Dent, Yorkshire, March 22, 1785; d. Cambridge, Jan. 27, 1873. He was graduated at Trinity College, Cambridge, in 1808, became a fellow there in 1810 and in 1816 was ordained in the Anglican Church. Because of general high ability he was appointed professor of geology at Cambridge in 1818, a chair hitherto something of a sinecure. Sedgwick, however, set at once about acquiring a knowledge of geology that enabled him to raise the chair to one of importance in the university: was one of the founders of the Cambridge Philosophical Society in 1819, through which he greatly assisted the development of the study of natural science; and labored indefatigably to augment the geological collections of the university, often at his personal expense. He continued his duties as a clergyman and made important geological investigations in Wales, Yorkshire, Devonshire, the Lake Country, the Isle of Wight and northern Scotland. He founded the Cambrian and the Devonian systems; but was for long engaged in a controversy with Murchison, whose Lower Silurian system overlapped Sedgwick's Upper Cambrian system. The matter was disputed until the substitution of the term Ordovician after Sedgwick's death. He was president of the Geological Society in 1829–1830, and was awarded its Wollaston medal in 1851. He was also awarded the Copley medal of the Royal Society in 1863. As a memorial to him the Sedgwick Museum was opened at Cambridge in 1903. Author of *Geological Relations and Internal Structure of the Magnesian Limestone* (1828); *Discourse on the Studies of the University of Cambridge* (1833); *Synopsis of the Classification of the British Palaeozoic Rocks* (1855), etc. With Sir Roderick Murchison he wrote *Physical Structure of the Rocks of Devonshire* (1839).

SEDGWICK, Anne Douglas (Mrs. Basil de Selincourt), American novelist: b. Englewood, N. J., March 28, 1873; d. Hampstead, Eng., July 21, 1935. She left the United States when a child and lived chiefly in Paris and London. She studied painting in Paris but later turned her attention to literature. She was married in 1908. Author of *The Dull Miss Archinard* (1898); *The Rescue* (1902); *Paths of Judgment* (1904); *A Fountain Sealed* (1907); *Tante* (1911); *The Nest* (1912); *The Little French Girl* (1924); *The Old Countess* (1927); *Dark Hester* (1929); *Philippa* (1930).

SEDGWICK, Ellery, American author: b. New York, Feb. 27, 1872. He was graduated at Harvard University in 1894 and taught at Groton School, Massachusetts, 1895–1896. He was on the editorial staff of the Worcester *Gazette* 1896 and *The Youth's Companion* 1896–1900; and from 1900–1905 was the editor of *Frank Leslie's Popular Monthly*. After a brief connection with *McClure's Magazine* and with Messrs. D. Appleton and Company, he became editor of the *Atlantic Monthly* and president of the company 1909–1938. In 1915 he was elected member of the National Institute of Arts and Letters. He has published *Life of Thomas Paine* (1899); *The Happy Profession* (1946).

SEDGWICK, Henry Dwight, American lawyer and author, brother of Ellery Sedgwick (q.v.): b. Stockbridge, Mass., Sept. 24, 1861. He

was admitted to the bar in 1884 and was engaged in practice in New York in 1885–98. He has since been occupied with literary work. Author of 'Letter of Father Cuellar' (1896); 'Life of Father Hecker' (1897); 'Life of Samuel Champlain' (1901); 'Life of Francis Parkman' (1904); 'The New American Type' (1908); 'Italy in the Thirteenth Century' (1912); 'An Apology for Old Maids' (1917); 'Dante' (1919); 'A Short History of France' (1928).

SEDGWICK, John, American soldier: b. Cornwall, Conn., 13 Sept. 1813; d. Spottsylvania C. H., Va., 9 May 1864. He was graduated at West Point in 1837 and served in the army from that time until his death, taking prominent part in three wars and in many engagements against the hostile Indians in the West. During the second Seminole War in Florida 1837–38, he was second lieutenant of artillery, was promoted in 1839, and took part in the Mexican War 1846–47, receiving promotion for gallantry after Churubusco and after Chapultepec. When the Civil War began he became lieutenant-colonel of artillery and rose to the rank of major-general. Stationed first at Washington, he was afterward commander of brigade, then of division in the Army of the Potomac, being placed in command of the Sixth army corps in 1863. He took part in the battle of Fair Oaks, the Seven Days' Battles; was severely wounded at Antietam, and after a leave rejoined the army in time for Chancellorsville and Fredericksburg. He played a distinguished part at Gettysburg, and in 1864 participated in the battles of the Wilderness and Spottsylvania, at which latter place he was shot by a Confederate sharpshooter during a movement of his troops. A bronze statue of him was erected at West Point in 1868. His death forms the subject of a painting by Julian Scott, now in the public library at Plainfield, N. J.

SEDGWICK, Robert, American colonist and soldier: b. Woburn, England, about 1590; died Jamaica, West Indies, 24 May 1656. He emigrated to Charlestown, Mass., in 1635, being one of the first settlers there; in 1638 he assisted in organizing the Ancient and Honourable Artillery Company of Boston (having received his training in the Artillery Company of London), and two years later became its captain. He rose to the command of the militia, in 1652. With John Winthrop, Jr., he helped establish, in 1643, the first iron works of the United States. Under Cromwell's orders he captured several French ports in the Penobscot region and in 1655 assisted in the capture of Jamaica. Cromwell raised him to the rank of major-general and made him governor of that island.

SEDGWICK, Theodore, American jurist and legislator: b. Hartford, Conn., May 1746; d. Boston, 24 Jan. 1813. He studied at Yale, was admitted to the bar in 1766, began practice at Great Barrington, Mass., and soon removed to Sheffield, where he attained eminence in professional and civil affairs, frequently representing the town in the Massachusetts legislature. At the beginning of the Revolution he entered the Continental army, serving on Gen. John Thomas' staff in the expedition to Canada, and later acting unofficially as commissary. In 1785–86 he was in the Continental Congress, and in the winter of 1787 was prominent in the suppression of Shays' rebellion (q.v.). He was speaker of the State house of representatives in 1788, and in that year also a member of the State convention for the ratification of the Federal Constitution; from 1789 to 1796 a representative in Congress; and in 1797–99 United States senator, being president pro tem. in 1797. Then he was again in the House, and its speaker until 1801. From 1802 until his death he was a justice of the Supreme Court of Massachusetts, being noted on the bench for the clearness of his opinions. He was one of council who secured a decision (1780) by which such a construction was given to the constitution of Massachusetts as to abolish slavery in that State. He was an active Federalist, and a member of the American Academy of Arts and Sciences.

SEDGWICK, Theodore, American author, son of Theodore Sedgwick (q.v.): b. Albany, N. Y., 27 Jan. 1811; d. Stockbridge, Mass., 9 Dec. 1859. He was graduated at Columbia College in 1829, and was admitted to the bar in 1833. He was attache at the United States legation at Paris in 1833–34, and afterward practised law in New York until 1850. From 1858 until his death he was United States district attorney of the southern district of New York. Author of 'Memoir of William Livingston' (1833); 'What is Monopoly?' (1835); 'Treatise on the Rules Which Govern the Interpretation and Practise of Statutory and Constitutional Law' (1857; 2d ed., 1874), etc. He edited the political writings of William Leggett (2 vols., 1840).

SEDGWICK, William Thompson, American biologist: b. West Hartford, Conn., 29 Dec. 1855; d. 26 Jan. 1921. He was graduated from the Sheffield Scientific School of Yale University in 1877 and later studied at Johns Hopkins University. He was an instructor at the former 1878–79; was at Johns Hopkins as a Fellow in biology 1879–80; as instructor and associate professor of biology at the latter also 1880–83. After 1883 he was professor of biology in the Massachusetts Institute of Technology. He was biologist for the Massachusetts State Board of Health 1888–96. He is a joint author of 'General Biology' (1886); and published 'The Principles of Sanitary Science and Public Health' (1902); 'The Human Mechanism' (1906).

SEDILIA, *in architecture,* originally the rows of seats in a Roman amphitheatre. Later applied to the stone seats on the south side of the altar in Roman Catholic churches; used by the priest, deacon and sub-deacon in the intervals of the church service. In cathedrals a row of such seats is provided for the clergy.

SEDIMENTARY ROCKS, as originally applied, a term used to indicate those deposits or sediments laid down by water, as contrasted with those rocks which have solidified from a fluid condition and known as igneous. The term has been somewhat expanded in recent usage, to include also the deposits formed by wind and those made by glaciers. They may be divided on the one hand into those laid down in the sea (marine), and those formed on land (terrestrial or continental). On another basis they are divided into aqueous, eolian and glacial. On still another basis they may be considered as of mechanical, chemical or

organic origin. The most familiar types are consolidated gravels, conglomerates; consolidated sands, sandstones; consolidated clay, shales; and consolidated marls or lime oozes, limestones. For a more detailed account of these rocks and the methods by which they are formed, see SHALE, SANDSTONE, and the section on *Sedimentary Rocks* in the article on ROCKS.

SEDITION, an offense short of treason but more serious than ordinary breach of the peace, or conduct tending thereto. Sedition, as a distinct offense, is unknown to English law, and is also unknown to United States laws, save in acts of Congress relating to the army and navy, and there it evidently means a mutiny or uprising against superior authority, for it is provided that a soldier joining any sedition, or who being present at a sedition does not do his utmost to suppress the same, shall be punished with death, while a sailor uttering seditious words can be punished at the discretion of a court-martial. State laws relating to sedition treat it as a minor offense, to be punished when it amounts to an actual attempt, whether in speaking or writing, or by actual violence, to agitate the overthrow, by unlawful means, of established authority. Anarchist meetings are within this description; when they lead to riot and murder, moreover, as in the case of the Haymarket Riot, in Chicago, the offense is more serious, and all parties concerned are held as principals or accessories to the crimes which result directly from their course of action.

The Alien and Sedition laws enacted by Congress in 1798 embodied an extension of the meaning of sedition which the majority of the American people evidently did not approve, and were aimed at freedom of speech and of the press. The motive for these laws was the suppression of the revolutionary tendencies excited by the French Revolution, the Republican (afterward called the Democratic) party sympathizing with the Revolution, and the Federalists being adverse at least to the extreme phases of that great convulsion. Several prosecutions under the Sedition Law served to make it more odious, and the censequence was the retirement of the Federalist party from power, and the election of Thomas Jefferson to be President of the United States. Since that time, except during the Civil War, no attempt has been made to interpret as sedition the editorial utterances of the press regarding current events. See ALIEN AND SEDITION ACTS.

SEDITION LAWS. See ALIEN AND SEDITION ACTS.

SEDLEY, sĕd'lĭ, SIR **Charles,** English poet, dramatist and wit: b. Aylesford, Kent, 1639; d. 20 Aug. 1701. He was educated at Oxford, but did not graduate. He wrote comedies and songs; of the latter one or two are still popular, but the former are unequal to his reputation. His first comedy, 'The Mulberry Garden,' partly founded on Molière's 'École des Maris,' was published in 1668; and among his other works of this class are 'Bellamira or The Mistress' (1687), based on the 'Eunuchus of Terence,' and 'The Grumbler.' In later life he entered Parliament and took an active part in politics, uniformly opposing the unconstitutional policy of James II, and was one of the chief promoters of the Revolution.

SEDRAT, the name given in the religious lore of the Mohammedans to the lotus tree, standing on the right-hand side of the invisible throne of Ali, with two rivers running from its roots. Its boughs extend farther than the distance between heaven and earth, while numberless birds sing among them, and countless angels rest beneath their shade.

SEDUCTION, *in law,* the act of wrongfully persuading a woman, as by promise of marriage, to surrender her chastity. The theory of this offense in English law is that it is not against the seduced person but against the parent or person standing in that relation, who may sue for damages for actual loss of services caused by such seduction. If this be proved, he can recover not only any pecuniary loss he may have sustained but also compensation for injury to his feelings and damages by way of punishment of the offender. Very slight evidence of service is sufficient to establish the relation of master and servant and to fix the defendant's liability. The action is usually brought by the father, but it may be brought by any person who stands in the relation of master to the seduced person. Usually the woman cannot sue in her own name, but in Scots law she may do so if the deceit of the defendant has been the sole cause of the injury. The action, as a rule, can be brought only in behalf of an unmarried woman, the seduction of a wife being known as criminal conversation, but in England it was formerly held that an action might be brought by the father of a married woman living in his house separated from her husband and giving even the slightest services to her parent. By statute, however, the husband can now demand damages in a suit for divorce where the seducer is corespondent. While the rule in England is that the parent cannot sue if the daughter is not performing at least slight services for him, this has been modified in the United States to the extent that the parent may bring action if he is entitled to her services during minority, whether she is in his service or not. Statutes in the United States have greatly modified the old common-law rule. For instance, seduction was not a crime at common law, but in many of the States it has been made so by statute if the woman seduced was previously chaste, particularly when accompanied by a promise of marriage. Likewise in some States the seduced woman may bring the action in her own name and may have both a criminal and a civil remedy.

SEDUM, a genus of plants of the family *Crassulaceæ,* the many species of which inhabit chiefly the north temperate and Arctic zones. They have succulent, generally smooth foliage, of varying form, but often crowded on the stems, and four or five parted flowers, with distinct petals, usually in cymose inflorescences and of pink or yellowish hue. The carpels of the fruit are separate or united at the base. The sedums are pre-eminently useful for rock-gardens, and for cultivation in plots or in poor soil, since they are remarkably hardy under adverse conditions. Some prefer barren rocks, and spread luxuriantly over them, thus earning their common name of stone-crop. Like the house leeks (*Sempervivum*), which they closely resemble, they are easily propagated by seeds

or offshoots, and are possessed of great vitality. *S. telephium* is the orpine (q.v.), a live-for-ever, or live-long, so called because a cut branch, fastened out of doors, will grow, and perhaps bloom, drawing upon the store of reserve tissue in its fleshy bulk, and since it will occasionally start into growth when pressed and dried it is also called Aaron's rod. This species was further known as Midsummer men, as it was used for love-charms on midsummer's night, two stems of it being set up to see if one, representing a lover, would turn to the other. *S. acre,* the English wall-pepper, is a common creeping plant covered with yellow, star-like flowers, fond of sunny, rocky places, and is an emetic and cathartic. One of the handsomest species is the old-fashioned border plant, *S. spectabile,* with upright stems and broad cymes of purplish flowers. *S. telephioides* and *S. roseum,* the rose-root or rhodia of old time shops, with rose-scented roots, make themselves conspicuous by growing in great masses on mountain ledges. *S. album* was formerly used as a medicine, and cooked or eaten as a salad under the name of worm grass or prickmadam.

SEE, Horace, American naval engineer: b. Philadelphia, 17 July 1835; d. 1909. He received his training as a mechanical engineer in a machine shop. As superintendent engineer of the firm of William Cramp and Sons he was identified with its fame as the builder of high-class ships. He is known as the inventor of the hydropneumatic ash ejector, the cylindrical mandrel for face bearings and other important mechanical devices. He was consulting engineer and naval architect for several noted corporations in the United States.

SEE, Sir **John,** Prime Minister of New South Wales: b. Felling, Huntingdonshire, England, 1844; d. 1907. In 1853 he went to Australia, and in 1880 was elected member of the colonial Parliament, to which he was re-elected several times as member for Grafton until 1904. In 1885 he was appointed Postmaster-general and from 1891 to 1894 was Treasurer. In 1899–1901 he held the portfolio of Chief Secretary and Minister of Defense, and from 1901 to 1904 was Prime Minister. In 1902 he was knighted. Ill health compelled his retirement in 1904.

SEE, Thomas Jefferson Jackson, American astronomer and mathematician: b. on a farm near Montgomery City, Mo., 19 Feb. 1866. In 1884 he entered the University of Missouri and was graduated (A.B., L.B., S.B.) at the head of his class in 1889, with the Missouri astronomical medal for an original thesis on the 'Origin of Binary Stars.' He at once entered the University of Berlin, for post-graduate study, and won with high honors the degrees of A.M., Ph.D., 10 Dec. 1892 Upon returning to America 25 Dec. 1892, he organized and had charge of the department of astronomy at the University of Chicago, and aided in establishing the Yerkes Observatory, 1894. In 1896 Dr. See entered upon a survey of southern double stars and nebulæ for the Lowell Observatory. During two years at Flagstaff, Ariz., and at the City of Mexico, he examined with a 24-inch telescope some 200,000 fixed stars, between 15 and 65 degrees south declination, and discovered some 600 new double stars, besides measuring about 1,400 stellar systems previously reorganized by Sir John Herschel and other observers. Dr. See lectured on Sidereal Astronomy at Lowell Institute, Boston, in December-January, 1898–99, and was immediately afterwards appointed professor of mathematics, United States Navy, by President McKinley. On duty at the Naval Observatory, Washington, 1899–1902, with 26-inch telescope, he observed double stars and satellites, and measured the planets and satellites by daylight and at night, thus deducing the absolute diameters and constants of irradiation of the chief bodies of the solar system. On duty at the Naval Academy, 1902–03; since in charge of the Naval Observatory, Mare Island, Cal. During 1902–03, he investigated the position of Laplace's "Invariable Plane of the Solar System"; and during 1904–06 carried out important researches on the moments of inertia, internal densities, pressures, temperatures and rigidities of the heavenly bodies, earthquakes, etc. He has made numerous other researches in regard to the origin of the solar system, the cause of the land and water hemispheres of the terrestrial globe, gravitation, etc.

He has published 'Die Entwickelung der Doppelstern-Systeme' (Berlin 1893); 'Researches on the Evolution of the Stellar Systems' (Vol. I, Lynn 1896); Vol. II, 'Capture Theory of Cosmical Evolution' (1910); 'Researches on the Physics of the Earth' (in Proc. Am. Philos. Soc. 1906–13); 'Dynamical Theory of the Globular Clusters' (in Proc. Am. Philos. Soc., 1912); 'Electrodynamic Theory of Magnetism and of Universal Gravitation: Discovery of the Cause of Gravitation, with proof that this fundamental force of nature is propagated with the velocity of light' (1915); 'Determination of The Physical Cause which has established the Unsymmetrical Equilibrium of the Solid Nucleus in the Fluid Envelope and thereby produced the well defined land and water hemispheres of the Terrestrial Spheroid' (in *Astrom. Nachr.,* Vol. 202, Kiel 1916); 'Eighth and Ninth Mathematical Memoirs on the New Theory of Aether' (1925–27).

SEE, a word applied to the seat or throne of a bishop, but more usually employed as the designation of the city in which a bishop has his residence, and frequently as that of the jurisdiction of a bishop, that is, as the equivalent of diocese. The Holy See is located in Rome.

By universal usage, see designates the city (thence, at least in popular language, the entire diocese) in which the seat of the bishop is placed. Sees have, as a rule, been in some city, or considerable town, and in general the name of a see is taken not from the district governed by the bishop but from the city or town. To this usage, the names of most of the Protestant Episcopal sees in America are an exception. Sees *In Partibus Infidelium* were those which retained their ancient names, though in many cases not merely the cities themselves, but even all traces of the Christian religion, in the sites on which they anciently stood, have disappeared. In the Roman Catholic Church, the Pope alone establishes sees, and alters their distribution and their local limits and boundaries; though

these changes are not made except in extreme cases without consent of the actual bishop. In the Church of England, all changes in dioceses, such as in their limits or boundaries, are done by authority of Parliament. In the United States, the General Convention of the Protestant Episcopal Church creates new sees and changes limits of diocese.

SEEBACH, zā'bäĸ, **Marie,** German actress: b. Riga, Latvia, Feb. 24, 1829; d. St.-Moritz, Switzerland, Aug. 3, 1897. She first appeared as a dramatic actress in Hamburg in 1852, and her fame was established two years later when she played various classical roles under the director Franz von Dingelstedt in Munich. She was married to the noted Wagnerian tenor Albert Niemann in 1859, but their marriage ended in divorce nine years later. In 1866 she became a member of the company of the Royal Theater in Berlin. She was distinguished for her performances in Shakespearean tragedy and in Goethe's *Faust* and *Egmont.*

SEEBOHM, sē'bōm, **Frederic,** English economic historian: b. Bradford, England, Nov. 23, 1833; d. Hitchin, Feb. 6, 1912. He was active in civic affairs, became a barrister in 1856, but devoted much of his attention to the study of the social organization of the Saxon, Celtic, and early English tribes. His publications include *The English Village Community* (1883), *Tribal Custom in Anglo-Saxon Law* (1902), *The Tribal System in Wales* (1895), and *Customary Acres* (1914).

SEECKT, zākt, **Hans von,** German soldier: b. Schleswig, Germany, April 22, 1866; d. Berlin, Dec. 27, 1936. After a succession of military posts he became chief of staff, in 1915, of the eastern armies under August von Mackensen. During 1917–1918 he served as chief of the general staff of the Turkish field army, and from 1918 to 1926 was commander in chief of the Reichswehr. He later helped reorganize the Chinese Army and served as an adviser to Chiang Kai-shek from 1932 to 1935.

SEED, Miles Ainscough, American inventor and manufacturer: b. Preston, England, Feb. 24, 1843; d. Pelham, N. Y., Dec. 4, 1913. He was educated in English public schools, and early undertook experiments in photography. In 1865 he came to the United States, and settled in St. Louis, Mo. For a period of years he was chief operator and manager of the photographic gallery of John Scholton. After perfecting a method for the manufacture of photographic dry plates, he established the M.A. Seed Dry Plate Company at St. Louis (1882), and manufactured the product. The plate was the first one suitable for X-ray and astronomical purposes. The company also introduced positive celluloid films, and produced other films and plates. The business and Seed's formulae were sold in 1902 to the Eastman Kodak Company, Rochester, N. Y. For five years thereafter, until his retirement, Seed was a special advisor to the company.

SEED PLANTS, or **SPERMATOPHYTES,** exceed in importance all other plants, since they are more effectively adapted to a land habitat than any other plants. They consist of two main classes, Gymnosperms and Angiosperms. In the Gymnosperms (naked-seeded plants), the seeds are borne on the surface of the carpel or cone scale. These are all woody, perennial forms and, with few exceptions, are evergreens. They are of great economic importance as sources of timber and resinous materials such as turpentine. They are a relatively small group, about 500 species. In the Angiosperms (covered-seeded plants), the seeds are formed within a closed structure, the ovary. There are more than 130,000 species of Angiosperms, a greater number than in any other class of plants. They include most of the species utilized by man as sources of food, clothing, medicines, and industry. Angiosperms are further divided into two classes, monocotyledons and dicotyledons. Monocotyledons possess: embryos with only one cotyledon, which is terminal; vascular bundles scattered throughout the stele in the stem; closed venation in leaves; flowers with the flowering parts in cycles of three. Grasses, including the important grains such as corn, wheat, and rice, are examples of this class. Dicotyledons possess: embryos with two lateral cotyledons; arrangement of vascular bundles in a ring in the stem; open venation of leaves; cycles of four or five in the flowering parts. A large proportion of our vegetables, flowers, and deciduous trees belong to this class. See also PLANTS AND PLANT SCIENCE—*Classification, Morphology, and Evolution* (Seed Plants).

SEEDS, the reproductive structures of seed plants. Developed from ovules, they consist of the *embryo* (rudimentary plant), *endosperm* (stored food in varying amounts and sometimes lacking), and the coats which form the protective layers on the surface. The embryo is the most essential part of the seed, consisting of the *plumule*[1] (the rudimentary stem), the cotyledon or *cotyledons* (seed leaves), the *hypocotyl* (the portion connecting the cotyledons and the radicle), and the *radicle* (rudimentary root). The embryo varies greatly in size and form in different seeds. For example, when the bean seed is mature the embryo fills the seed, while in the case of orchids or American holly the embryo is just a mass of undifferentiated cells at the time of seed maturity. At germination (sprouting), the plumule develops into the shoot, and the radicle into the root. The cotyledons may or may not appear above ground. In some cases, they function as real leaves, turning green and carrying on photosynthesis for a while. In the hypocotyl region of the embryo axis, the transition from stem to root tissues of the new plant takes place.

Seed formation usually follows fertilization of the egg nucleus of the ovule by a male nucleus from the germinating pollen grain, the fertilized ovule developing into the embryo of the seed. The endosperm, or stored food for the young embryo, develops after the conjugation of a second male nucleus from the pollen tube with two other nuclei in the embryo sac. This double fertilization occurs in most Angiosperms, but the resulting endosperm is not always present in the mature seed since it may be used up by the embryo in its development as in the case of many legumes. In the Gymnosperms, the endosperm tissue is entirely gametophytic, being produced by the ovule without any fertilization.

[1] Sometimes called *epicotyl.*

Although seed formation is usually dependent upon a fertilization process, seeds may be formed from certain parts of the ovary normally considered as purely vegetative. Such seeds, containing both embryo and endosperm, are formed by the dandelion, for example. Development of seeds without fertilization is known as *apomixis.*

Seeds, the ripened ovules of flowers, are usually contained in fruits that develop from ovaries. If the fruits are dry and indehiscent, they may be called seeds. Such fruits are the caryopsis or grain, the achene, characteristic of Compositae, the schizocarp, illustrated by Umbelliferae, and the nut.

Food stored in seeds is a source of energy for the germination and early development of the seedling, but it is also of the utmost importance for the nutrition of man and other animals. Seeds are rich sources of carbohydrates, fats, and proteins, as well as of mineral matter and other accessory foods. Also many valuable ingredients of medicines are found in some seeds.

Dispersal of Seeds.—Many seeds have become adapted to dispersal by various agents, including wind, water, birds, fur-bearing animals, and man.

The wind is one of the principal agents concerned. A large number of plants rely entirely upon the small size of the seed and its light weight for distribution. Among these are orchids, poppies, and gentians which produce capsules opening in various ways to expose the minute seeds within them to the wind. Other seeds or fruits have developed special structures to facilitate dispersal by wind. Winged seeds are characteristic of lily, tulip, and pine, for example, and maple and elm are among those plants with winged fruits. Many grasses also have wings on specialized coverings of the seeds. The so-called parachute seed pod of *Aristolochia,* a native of the Philippines, represents an extreme adaptation for dispersal by wind. When its seeds are ripe, the pods split to form six parts suspended by a thread attached to the stem of the vine. The split pod hangs upside down on the vine and the seeds are shaken out by the wind. Many members of the Compositae, such as the dandelion, have seeds with a tuft of fine hairs that facilitate wind dispersal.

Water may play an important part in the transportation of seeds for long distances. The distribution of the coconut palm over the surface of the earth, for example, is thought to be due in part to the germination of ocean-borne nuts which drifted or were carried by the current from their original location. Mature seeds of aquatic plants such as water lilies are covered with a gelatinous substance which gives buoyancy for their flotation away from the parent plant.

Birds are especially important in the dispersal of seeds associated with juicy pulp, such as berries and cherry. Seeds carried by fur-bearing animals are principally those of grasses or of weeds equipped with spines, such as cocklebur, tick trefoils, and sand burs. Human beings also carry such seeds on their socks, or other parts of their clothing. Ants have been observed to disseminate the seeds of *Trillium* and bloodroot.

Many plant families do not depend on any special agent but have developed mechanical devices for ejection of their seeds. Pressures and tensions are developed in the mature fruits throwing the seeds out. In the legume family, pods may twist into spirals, while touch-me-not pods simply collapse. In violets, the pods split into three valves which press on the enclosed seeds to release them. In the wood sorrels, the outer seed coats turn inside out with enough pressure to cast the enclosed seeds for some distance. In witch hazel, the inner, woody layer of the mature, drying seed capsule curves inward, producing pressure enough to shoot the seeds out with some force.

Seed dispersal is of prime importance for the survival and distribution of plants over the surface of the earth.

Germination.—Seedsmen, nurserymen, and home gardeners have all experienced difficulty at one time or another in the germination of seeds. If the seeds possess a dormant embryo, or impermeable seed coats, as is the case of many trees and shrubs, there are very definite and simple procedures which may be used to bring about germination (see section on *Dormancy*). If, on the other hand, the embryos are not dormant, but the seeds still fail to germinate under ordinary conditions, some other treatment must be given. Some of our common seeds have special germination requirements.

Certain specific temperature conditions are necessary for the germination of many forms. For example, wild columbine seeds germinate very poorly at a constant temperature as high as 25°C. but give excellent germination if the daily temperature alternates between 15° and 25°C. Annual delphinium or larkspur seeds show very poor seedling production at temperatures about 15°C. but can be induced to germinate at temperatures as high as 30°C. by pretreatment on a moist medium for one, two, or three weeks at temperatures of about 10° or 15°C. Lettuce seeds can also be made to germinate at high temperatures normally inhibitive by pretreatment for four days in a moist condition at 5°C.

The difficulties encountered by many rock-garden enthusiasts in the germination of seeds may be attributed to any one of several factors. Seeds of *Primula obconica* and *Ramondia pyrenaica* require light for germination. Although light is not essential for the germination of seeds of *Draba aizoides, Gentiana lagodechiana, Mimulus langsdorfii,* and *Primula denticulata,* exposure of all these seeds to light during the germination process permits seedling production at temperatures ordinarily inhibitive. Other rock-garden plants, such as *Calochortus macrocarpus, Camassia leichtlinii,* and *Lewisia rediviva,* germinate only at low temperatures of approximately 5°C. Still another group of rock-garden plants, including *Draba alpina, Meconopsis cambrica,* and *Gentiana crinita,* possess dormant embryos and must be pretreated at low temperature, after which germination proceeds at ordinary greenhouse temperatures.

Many weed seeds not only show a delay in germination but are capable of distributing their seedling production over a period of years. This fact is demonstrated repeatedly by the years of cultivation necessary to get rid of weeds in a garden plot, even if care is taken to eradicate all weeds as they appear and to prevent the introduction of new weed seeds. The soil contains many dormant seeds which produce plants promptly when cultivation, excavation, or erosion give them the moisture, temperature, and oxygen supply or the exposure to light required for germination.

Dormancy.—Seed dormancy is a term used to signify the failure of viable seeds to germinate when they are placed under conditions of moisture and temperature which would ordinarily

bring about sprouting. This is in contrast to the so-called dormancy of the dry, resting seed. The term, *afterripening,* signifies the preparation of the seed for resumption of growth. Dormancy is of definite advantage to the continuance of the species in that germination under conditions unfavorable for seedling survival is prevented. This is true for many temperate-zone forms whose seeds mature in the autumn. If germination took place immediately, the young seedlings would not be able to withstand the rigorous winter weather and would all be killed. Again, in the case of certain desert annuals, dormancy at maturity prevents germination at the close of a rainy growing season and the beginning of a dry season which the young seedlings could not survive. Some seeds possess impermeable seed coats which prevent their germination for years or even for centuries. This feature characterizes many of the legumes, as well as some other forms, and permits their distribution in time instead of space. In addition to the numerous seeds which are dormant in the dry state, there are many which have a prolonged primary dormancy or an induced secondary dormancy in the wet state. The most common example of the latter are weed seeds of various kinds which remain ungerminated and fully viable for years in the soil. Experiment has shown that some seeds fully imbibed with water live for as long as 60 years buried in the soil. This has also been demonstrated in many cases where unusual plants have appeared on excavated or bombed sites.

A type of dormancy of low intensity is that exhibited by many seeds at maturity but which disappears after a period of dry storage. This is characteristic of many grains and flower seeds and of some vegetable seeds, notably lettuce.

It has long been known that certain seeds, especially of the family Leguminosae, possess coats which prevent the absorption of the water necessary for germination. Among the known methods for making the coats permeable are shaking or mechanical scarification, soaking in concentrated sulphuric acid or alcohol, and hot water or other special temperature treatments.

Many plants, especially those of the temperate zone, have seeds with dormant embryos. The method commonly used to break this dormancy is pretreatment in a moist medium at low temperature, usually between 1° and 10°C. This process has been used by nurserymen for a long time under the term *stratification,* so called because of the practice of alternating layers of sand with layers of seeds for winter treatment. Some seeds with dormant embryos do not afterripen in a moist medium at low temperatures because their coats are impermeable to water, which must be absorbed before the necessary changes can take place. In these cases, it is essential to make the coat permeable by mechanical or chemical treatment after which a period at low temperature brings about the breaking of the dormancy.

The seeds described above which respond favorably to low temperature pretreatment become afterripened while still enclosed in the seed coats, and once growth has been resumed by the embryo, the green plant appears above ground in a short time. Another type of dormancy has been found in which the seed germinates to form a root without any pretreatment, but once the root is formed, low temperature must be given to break the dormancy of the shoot or the bud that forms it. This has been designated as epicotyl dormancy. The two-year lilies, the tree peony, and several species of Viburnum belong in this category.

When all of the coats of seeds of some rosaceous forms, such as peach, apple, and hawthorn, are removed, a certain percentage of the embryos, which require cold stratification for normal development, will grow at greenhouse temperatures to form dwarf plants. In such physiological dwarfs, normal growth is readily initiated after exposure of the seedling to a cold period.

Finally, an extreme type of dormancy is shown by seeds of such forms as Convallaria, Smilacina, and Trillium. These require pretreatment at low temperature to break the dormancy of the root, a period at high temperature to permit the root to grow, another period at low temperature to break epicotyl dormancy, and a second period at high temperature to permit the growth of the afterripened epicotyl to form a green shoot.

The cause or causes of physiological dormancy are not known, though many of the chemical and physical changes which accompany the breaking of dormancy are known. See also PLANTS AND PLANT SCIENCE—*Physiology and Biochemistry* (Dormancy).

Storage.—Seed storage methods are very important in the maintenance of viability of all seed types. The performance of any seed depends less upon its actual age than upon the conditions under which it has been stored. Experimental investigations of the effect of different factors on the keeping quality of seeds have demonstrated that temperature and moisture are of vital importance. It has been known for a long time that low temperature is more desirable than higher temperature, but temperatures above freezing, especially between 5°C. and freezing, have been considered adequate. The truth is, however, that a very moist atmosphere at 5°C. often brings about more rapid deterioration than ordinary room temperature. This emphasizes the fact that a cool place is not always the best place to store seeds. More recently, experimental evidence has shown the superiority of below-freezing temperatures to those just above freezing for maintaining seed viability. This difference becomes significant as the storage period lengthens to more than 10 years.

Seeds with high moisture content deteriorate more rapidly than those with low moisture, provided they will tolerate drying. Sealed containers are beneficial to maintain low moisture content. There is more rapid degeneration of seeds stored in sealed containers which are opened and sealed repeatedly than of seeds in sealed containers which are never opened from the time of storage to the time of testing. Under adverse temperature and humidity conditions, there may be a favorable effect of reduced oxygen supply.

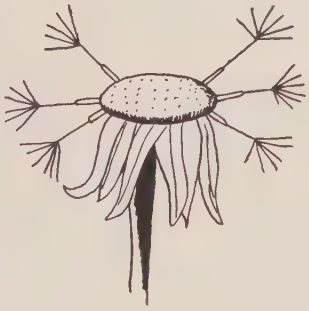
Some seeds are short lived by virtue of the fact that they do not tolerate drying. Among these are citrus seeds and those of many tropical plants. Even these may have the life span extended by adjustment of moisture content and storage at a temperature of about 5°C.

The oldest known viable seeds are those of the Indian lotus found in a naturally drained lake bed in Manchuria. Radioactive carbon tests have shown their age to be 1040 ± 210 years.

Testing.—Seed testing and analysis of agri-

Upper: Aristolochia seed capsules.
Lower: Apple fruit.

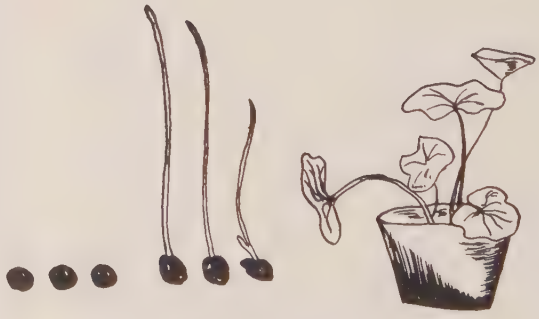
Stages in germination of
lily-of-the-valley seeds.



Dandelion head showing achenes
with attached pappus.

Fruit of tree peony showing seeds.

Seed follicles and seeds of *Aconitum.*



Germination of Indian lotus,
oldest known viable seeds.

cultural and vegetable seeds, to determine, as nearly as possible, the actual planting value of the seed lot and to be sure of the purity of the seeds, have come to be general practice. Seed laws in many parts of the world specify certain standards that must be met before seeds can be offered for sale. This has resulted in the development of special sampling and testing equipment and prescribed, detailed methods for testing the germination and purity of all types of commercial seeds. An important part of this testing deals with an examination of the seed sample for noxious-weed content and for other impurities, as well as the origin of the seeds, and testing for trueness of variety. More recently, emphasis is being placed on pathological considerations in seed testing, and procedures are being developed to test the seeds as hosts and carriers of disease organisms. Progress has been made in the standardization of national and international rules for seed testing in the interest of uniformity and of world trade. The responsibility for seed quality is placed upon the individual or firm which grows and markets the seed, but state and federal governments provide the control through special laboratories for seed testing.

In order to get a true index of the planting quality of seeds, their germination capacity must be tested under special conditions required by that seed. In most cases, the tests are very simple since the seeds germinate easily. However, light is required for germination of many grasses and some vegetable seeds, and potassium nitrate may be substituted for light requirement in some cases. Prechilling moist seeds at low temperature, high temperature treatment, combinations of low and high temperatures in daily alternations, mechanical abrasion of the seed coat, soaking in water, or predrying are some of the special procedures used to test these seeds.

In addition to the microscopic examination of seeds for purity and identification, sometimes other methods have to be used to determine variety. For example, Italian ryegrass can be distinguished from perennial ryegrass by a fluorescence test of the roots under ultraviolet light. Italian ryegrass roots fluoresce, while the others do not.

SEED INDUSTRY

The seed industry comprises the development, production, collection, cleaning, packaging, marketing, and shipping of seeds, which are a vital part of the economy of the world. Special services of geneticists and plant breeders who work to develop superior seeds; of physiologists who investigate the nutrition and other growth characteristics of the plant as affecting seed set and quality; of plant pathologists who are constantly working on disease problems; of growers who must learn the highly specialized techniques of seed production; and of equipment manufacturers who must supply the many types of apparatus and materials necessary for the different phases of the industry are required for the functioning of this very complex and highly important industry. A few figures will serve to emphasize the scope of the seed industry in the United States. The 1949 production of corn, for example, was 3,238,618,000 bushels valued at $4,034,035,000. In the same year 1,098,415,000 bushels of wheat and 1,864,780,000 pounds of peanuts, valued at $2,061,897,000 and $193,496,000 respectively were produced. Turning to forage crops, 104,950,000 pounds of clean seeds of alfalfa valued at $39,243,000 and 148,690,000 pounds of red clover seed valued at $45,306,000 were produced in 1950. In 1951, 100 commercial seed growers planted 83,953 acres of wrinkled garden peas, one of two principal types of peas grown, which yielded 94,699,000 pounds of seeds.

Hybrid corn may be taken as an example of one of the greater crop developments of all times. Geneticists have greatly improved a plant which has been in use for thousands of years by the establishment of pure lines and the subsequent hybridization of these lines to produce seeds which possess hybrid vigor manifested in the plants grown from them. The parent plants are grown side by side in large, isolated fields and are pollinated by wind. Only pollen from the male parent must be allowed to fall on the silks of the female parent, and this necessitates the removal of all of the tassels from the seed parent, involving much labor and expense. Furthermore, the accidental removal of leaves in the detasseling operation reduces the seed-producing capacity of the plant. Recent research has shown that cytoplasmic male sterility may be induced in the seed parents, thus eliminating the necessity of detasseling, since no pollen is produced on these male-sterile lines. In view of the fact that some 8 million bushels of seeds are needed to plant the corn acreage each year, the practical value of this research is great. It should also be pointed out that a double cross is used in corn hybrid seed production; the first cross being between two inbred lines and the second hybridization involving the crosses of these inbreds. This process must be repeated each year.

The superiority of hybrid seed corn is best demonstrated by the rapid rise in its use from a small beginning in 1933. Now, more than 75 per cent, and in some areas 100 per cent, of the corn acreage in the United States is planted with hybrid seed. The production and sale of hybrid corn seed had an estimated value of about $75 million in the United States in 1946. Since that time, it has been introduced in many other countries, including India, Germany, Italy, and France, where it is hoped that it will result in increased yield and solve some of the food problems for both livestock and people. Researchers are still scouting regions of Central and South America for promising corn varieties which have never been studied to date. They hope to develop still better strains of corn—bigger plants with larger ears, and with more resistance to heat, drought, excessive rain, cold, insects, and diseases.

In addition to the seeds grown for feed, for man, or for livestock, there is a large and thriving flower seed industry. The importance of tree seeds, also, should not be overlooked. They are required for reforestation of lands denuded by erosion, burning, or cutting and are essential in conservation and timber production and the maintenance of a food supply for wildlife. In 1939, about 484,000 acres of land were replanted in this program, requiring about 145 tons of forest seed. It is estimated that 45 million acres are still in need of planting in the United States.

In time of war the seed industry is one of utmost importance. For example, approximately a billion packets of vegetable seeds as well as grass and clover seeds totaling 42 million pounds were purchased for lend-lease in 1941 and 1942.

The beginnings of the seed trade in the United States are obscure. The early colonists brought seed with them, and these were added to the

seeds of the Indians of precolonial times. Seeds were saved by the growers for their own use and doubtless other seeds were imported. Some of the earliest advertisements offering seeds for sale appeared in Boston and Philadelphia papers about 1720. The inadequate mail service during the 18th century permitted only local distribution, but with the establishment of a system of post riders, seedsmen began to operate on a larger scale. The American Seed Trade Association was founded at New York City, N. Y., on June 12, 1883. This organization has been effective in promoting the treatment of seeds for disease control and the certification of seeds for both freedom from disease and trueness of variety. See also section —*Seed Testing and Analyses.*

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SEEGER, sē'gĕr, **Alan,** American poet and soldier: b. New York, New York, June 22, 1888; d. Belloy-en-Santerre, France, July 4, 1916. Following his graduation from Harvard in 1910 he did desultory writing, both in prose and verse. Although he rebelled against many literary conventions, he did employ the ordinary verse forms. In 1912 he went to Paris, where he continued his writing and attended classes in painting. At the outbreak of World War I he at once enlisted in the French Foreign Legion as a private. Despite his fatalistic philosophy he was a good soldier and won the Croix de Guerre and Médaille Militaire. He wrote many poems, the most famous of which is *I Have a Rendezvous with Death.* His *Collected Poems* were published in 1916.

SEEKONK, river, Rhode Island. See BLACKSTONE.

SEELEY, sē'lĭ, SIR **John Robert,** English historian and essayist: b. London, England, Sept. 10, 1834; d. Cambridge, Jan. 13, 1895. He was graduated from Christ's College, Cambridge, in 1857, and subsequently was elected a fellow and made classical lecturer there. He published under the pseudonym of John Robertson a book of poems in 1859, and was appointed in 1863 professor of Latin at University College, London, where he continued until 1869. His controversial essay, *Ecce Homo,* published in 1865, is in many respects the best and certainly the best known of his works. It was a simple account of the life and teaching of Christ, dealing with these wholly from the human side. He was professor of modern history at Cambridge in 1869–1895. Further publications of his are *Natural Religion* (1882), which endeavors to establish a reasonable religion and avoids a discussion of supernaturalism; *The Expansion of England* (1883), a popular narrative from the imperial viewpoint; *The Growth of British Policy,* 2 vols. (1895); and *The Life and Times of Stein* (1878).

SEELY, John Edward Bernard (1ST BARON MOTTISTONE), British political leader: b. May 3, 1868; d. London, England, Nov. 7, 1947. Educated at Harrow and Trinity College, Cambridge, he entered the Inner Temple in 1897. He participated both in the South African War and World War I, was undersecretary for the colonies, 1908–1910, undersecretary of state for war, 1911, and the following year began a two-year term as secretary of state for war. He served numerous terms as a member of Parliament and in 1918 reached the military rank of major general. The French government awarded him a gold medal in 1891 for saving life at sea, and in 1933 he was created a baron.

SEELYE, Julius Hawley, American clergyman and educator: b. Bethel, Conn., Sept. 14, 1824; d. Amherst, Mass., May 12, 1895. He was graduated from Amherst in 1849 and afterward studied theology at the Auburn Theological Seminary and at the University of Halle. From 1853 to 1858 he was pastor of the First Reformed Dutch Church of Schenectady, N. Y., from which charge he was called as professor of philosophy to Amherst College. In 1876 he succeeded to the college presidency. He was a member of a commission for the revision of the tax laws of Massachusetts and from 1875 to 1877 was a member of Congress. His writings include *The Way, the Truth, and the Life* (1873), *Christian Missions* (1875), and *Empirical Psychology* (1882).

His brother, LAURENUS CLARK SEELYE (b. Bethel, Conn., Sept. 20, 1937; d. Northampton, Mass., Oct. 12, 1924), became president of Smith College in 1873. He had graduated from Union College in 1857 and during the next six years studied theology at Andover, Mass., and at Heidelberg and Berlin, Germany. After a brief pastorate in the Congregational Church at Springfield, Mass., he accepted the chair of English literature at Smith in 1865. In 1910 he became president emeritus.

SEFSTROM, sâv'strûm', **Nils Gabriel,** Swedish chemist: b. Ilsbo, Halsingland, Sweden, June 2, 1787; d. Stockholm, Sweden, Nov. 30, 1845. He received a doctor's degree in 1813. From 1812 to 1820 he taught chemistry at the royal war college in Karlberg. Thereafter, until 1838, he taught chemistry at the newly built mining school at Falun. He joined the royal mining college at Stockholm in 1839 as director of laboratories, of the mineral exhibits, and of the library. He was a member of the Swedish Royal Academy of Sciences beginning in 1815. In 1830 he rediscovered the element vanadium.

SEGANTINI, sā-gän-tē'nē, **Giovanni,** Italian artist: b. Arco, Trentino, Italy, June 15, 1858; d. Schafberg, Switzerland, near Saint-Moritz, Sept. 28, 1899. Bred in poverty, his mother dead, and abandoned by his father, he made a living for himself in his early teens by herding flocks in the hills during which time he amused himself by sketching surrounding scenes. His drawings becoming known, and after further vicissitudes, he studied at the Brera Academy, Milan, while supporting himself by portrait painting and tutoring in art. In 1882 he settled near Lake Como, where he painted the *Ave Maria,* which was awarded the gold medal at the Amsterdam Exhibition in 1883. He moved to the Swiss Alps in 1886, where under the influence of Frédéric Millet he sought his subjects in the lives of the lowly agriculturalists of the region. *The Drinking Place* won the gold medal in Paris in 1889 and *Ploughing in the Engadine* won the gold medal at Turin, 1892. Among others of his famous works are *At the Tether, Dark Hours, Unnatural Mothers,* and *Punishment of Luxury.* At Saint-Moritz is the Segantini Museum, where many of his pictures are exhibited, including his unfinished panorama of the *Alpine World.*

SEGESTA, sē-jĕs'tē, (Gr. *Egesta*), an ancient city of Sicily, toward the northwestern extremity of the island, eight miles southwest of the modern Alcamo. It was built upon the steep Mount Barbaro, near the river now known as Fiume Gaggera. Segesta formed an alliance with Athens in 416 B.C., and in 413 B.C. with the Carthaginians (after the fall of Syracuse). In the first Punic war, it became subject to Rome, thus acquiring the name Segesta. The ruins of the ancient city are extensive; the most remarkable are the Greek theatre and temple.

SEGMENTATION OF THE EGG. See EMBRYOLOGY.

SEGOU, sā-gōō', French West Africa, town of the French Sudan, situated on the right bank of the river Niger 350 miles southeast of Tombouctou. It is the center of an important agricultural region whose produce is transported by water to railhead at Koulikoro. An extensive system of irrigation has been carried out in the Segou district north of the Niger. Pop. (1940) 8,391.

SEGOVIA, sā-gō'vyä, or **WANKS,** river of Central America, for much of its course forming the disputed boundary between Honduras and Nicaragua. Rising in northwest Nicaragua, it flows northeast for a distance of some 450 miles, entering the Caribbean Sea at Cabo Gracias à Dios; it is navigable for 150 miles from the mouth, but the upper part of its course is obstructed by cataracts and shallows. The Segovia is also known as Cape River, or Coco.

SEGOVIA, Spain, (1) a central province, northwest of Madrid Province and southeast of the Province of Valladolid, 2,682 square miles in area. For the most part the province is an elevated tableland, terminated, in the southeast, by the lofty Sierra de Guadarrama. The principal agricultural products are wheat, barley, madder, flax, and hemp; grapes, olives, carobs, and chestnuts also do well; and large numbers of sheep are raised. Minerals found in the mountainous parts of the province include silver, copper, lead, and iron, and there are quarries of excellent granite and marble. Pop. (1944 est.) 194,752.

(2) Capital of the province of the same name, a walled town standing high above the river Eresma, 43 miles northwest of Madrid, dominated by an ancient citadel, or alcazar. Its old-fashioned buildings are quaint but stately; its cathedral, a fine specimen of the Gothic, is scarcely surpassed in Spain. There are, besides, several other churches, suppressed convents, a bishop's palace, a mint, a military academy, a church seminary, a theater, hospitals, and a picture gallery. The lofty aqueduct (built by Trajan) is the finest Roman ruin in Spain. Segovian Romanesque architecture is one of the most remarkable provinces of Spanish art. In few parts of the world can so much fine architecture and decorative sculpture be found. Paper, linen, and glass are manufactured. The kings of Castile and Leon made Segovia their place of residence. In 1808 the town was entered and sacked by the French troops. Pop. (1940) 24,258.

SEGREGATION, in geology that tendency of mineral ingredients to separate from the parent magma, and to crystallize out, each by itself. In granite and other crystalline massive rocks, veinlike portions are found in which the matter is either coarser or finer than the rest of the mass. These were produced at the final stage of cooling of the rock, when the segregation from the original molten or viscous mass occurred along certain lines or around particular centres. These are termed segregation veins. Cracks or cavities may also be filled with mineral matter segregated from the surrounding rock mass. See MINING.

SEGUIDILLA, sā-gē-dēl'yä, a Spanish form of versification, consisting of four generally assonant lines, of seven and five syllables alternately. It usually has a close of three verses, called *estribillo,* of which the first and last lines rhyme.

SEGUIN, sā'gwĭn, **Edouard Onesimus,** American psychiatrist: b. Clamecy, France, Jan. 20, 1812; d. New York City, Oct. 28, 1880. He was the father of Edward Constant Seguin (q.v.). In 1839, after studying medicine under Jean Gaspard Itard, he opened a school in Paris for the teaching of the feeble-minded. Immigrating to the United States in 1849, he established several similar institutions. He practiced in Ohio, first in Cleveland and then in Portsmouth, before settling in New York City. In 1861 he obtained a medical degree at New York University. He was commissioner of the United States to the Austrian international exposition, in Vienna, in 1873. During his later years he gave attention to the study of animal heat and invented a physiological thermometer.

SEGUIN, Edward Constant, American neurologist: b. Paris, France, 1843; d. New York, Feb. 19, 1898. He was the son of Edouard Onesimus Seguin (q.v.), and accompanied his father to the United States in 1849. Educated in the public schools of Ohio, he began studying medicine under his father in 1861, and continued it at the College of Physicians and Surgeons, Columbia University, where he graduated in 1864. He spent two years in the medical department of the Union Army while enrolled as a student, and contracted a tubercular difficulty, to cure which he served among the United States volunteers at Little Rock, Ark., during part of 1864–1865, and again in New Mexico during 1868–1869. During the winter of 1869–1870 he studied nervous diseases under leading specialists in Paris, and following his return to the United States he entered private practice in New York City. For 10 years he was pathologist to the Connecticut Hospital for the Insane; and from 1871 to 1885 he was a member of the faculty of Columbia's College of Physicians and Surgeons, lecturing on the spinal cord and on nervous diseases. In 1873 he founded a clinic for nervous diseases; he advocated the use of drugs when administered with care, and, in stubborn cases, the use of iodides in large doses. During 1876–1878 he edited *American Clinical Lectures,* and from 1879 to 1884 he was editor of the *Archives of Medicine;* in 1884 he published *Opera Minora.* He was one of the founders of the American Neurological Association and of the New York Neurological Society. He bequeathed to the Academy of

Medicine his large collection of books and pamphlets relating to nervous diseases, and to the College of Physicians and Surgeons other books and instruments.

SEGUIN, sū-gēn′, **city, Texas, county seat** of Guadalupe County, on the Guadalupe River, altitude 530 feet, 33 miles east-northeast of San Antonio, on the Southern Pacific Railroad. In a cotton raising and diversified farming region, its manufactures include brick and tile, clothing, insecticides, and dairy products. Settled in 1832 and platted in 1838, it was incorporated in 1853. It has a council-management government. Pop. (1950) 9,733.

SEGUR, Comte **Louis Philippe,** French dramatist and historian: b. Paris, France, Dec. 10, 1753; d. there, Aug. 27, 1830. He was forced by his father to enter military life, served under Rochambeau in America, was appointed ambassador to Russia in 1783, and after the overthrow of the monarchy devoted himself to literature. Appointed a member of the council of state by Napoleon, he became a member of the Chamber of Peers after the Restoration. He published *La politique de tous les cabinets de l'Europe* (1793); *Théâtre de l'Hermitage* (1798); *Tableau historique et politique de l'Europe de 1786–96* (1800); *Histoire des principaux événements du règne de Frédéric-Guillaume II* (1800); *Histoire universelle* (1817); *Histoire de France,* 2 vols. (1824–1834); *Mémoires ou Souvenirs et Anecdotes* (1825); *Oeuvres completes* 34 vols. (1824 et seq.).

SEGUR, Comte **Philippe Paul,** French historian, son of the preceding: b. Paris, Nov. 4, 1780; d. there, Feb. 25, 1873. He entered the army in 1796 and rose to be brigadier general and aide-de-camp to Napoleon during the Russian campaign. He was made a peer by Louis Philippe, and after the second Restoration retired to private life. He wrote *Histoire de Napoléon et de la grande armée en 1812* (1824); *Histoire de Russie* (1829); *Histoire de Charles VIII* (1835).

SEGURA, sā-gōō′rä, the Tader of the Romans, a river of southeastern Spain some 200 miles in length. Its head waters are three widely branching mountain streams, one descending La Sagra peak in Granada from an altitude of 7,875 feet, the others flowing down from the Sierra de Segura in Jaen. The river trends in an easterly direction past the city of Murcia to empty into the Mediterranean 19 miles southwest of Alicante. As it drains semiarid highlands and much of its volume is diverted to irrigate the fertile lower valley, even its estuary is navigable only to small boats.

SEHESTED, sē′ĕs-tāth, **Hannibal,** Danish statesman: b. Arensborg Castle, Ösel Island (then Danish), 1609; d. Paris, Sept. 23, 1666. Educated abroad, he returned to Denmark in 1632 and held posts at the court of Christian IV. Sent to Sweden to negotiate a treaty with Oxenstierna and propose a marriage between Crown Prince Frederick and Gustavus Adolphus' heiress, Christina, he was unsuccessful. Some years later he married his sovereign's daughter Christine and was appointed viceroy of Norway (1642). During Christian's second war with Sweden (1643–1645) he ably supported the Danish cause, invading Sweden four times. Thereafter, in order to strengthen the defense against Sweden he continued to improve Norway's finances and economy and build up her naval force. The machinations of his enemies in the Danish Rigsraad drove him into exile in 1651; but Frederick III recalled him in 1660. He negotiated the peace with Sweden and was rewarded with high offices.

SEIDEL, sī′d'l, **Emil,** American socialist politician: b. Ashland, Pa., Dec. 13, 1864; d. Milwaukee, Wis., June 24, 1947. He learned the wood carver's trade in Germany. One of the organizers of the Wood Carvers' Union and of the Socialist party at Milwaukee, Wis., he was Socialist candidate for governor of Wisconsin in 1902; and was elected mayor of Milwaukee in 1910, the first Socialist mayor of a major American city.

SEIDL, zī′d'l, **Anton,** Hungarian composer and musical director: b. Budapest, Hungary, May 6, 1850; d. New York, March 28, 1898. He studied at the Leipzig Conservatory, and later at Budapest under Hans Richter, and by that musician was recommended to Richard Wagner when the latter was preparing for the opening of the Baireuth Festspielhaus. As a consequence he came into intimate association with Wagner and acted as stage manager during the first season of music dramas there in 1876. In 1878 Seidl became musical stage manager at the Royal Opera House, Vienna, and the next year migrated to Leipzig where he was made conductor. After conducting the Nibelung dramas at London in 1882 he joined a company traveling through Germany, Austria, Hungary, Italy, Belgium and Holland during the seasons of 1883–84, which produced only the Wagner operas. He was made conductor at the Metropolitan Opera House, New York, in 1885 after the death of Dr. Leopold Damrosch, and lived in America thereafter.

SEIDLITZ POWDER, an aperient powder named from the mineral spring of Seidlitz or Sedlitz in Bohemia.

SEIGNIORIAL TENURE. The system of Seigniorial Tenure was that system of public and private relations based upon the tenure of land which the French government undertook, during the course of the 17th and 18th centuries, to introduce into its North American colonies, and more especially into the colony of New France, now Canada. The system of feudal—or as in its later stages it came to be called—seigniorial tenure, was deeply rooted in France, and it is easy to understand how its introduction into the colonies appealed to Richelieu as a means of providing estates for many of the landless aristocrats of France. Moreover as feudalism was now so far advanced in decay as to be no longer a menace to the central power, it is easy to see how the system appealed to the Bourbon monarchs as likely to permit in the colonies that centralization of authority which characterized France at this time.

As regards Canada, the seigniorial system had its origin in 1627 when the French King granted to the Company of New France, more commonly known as the Company of One Hundred Associates, the whole of the French possessions in North America as one immense fief with full power to sub-grant it in seigniories to settlers.

During the whole 35 years of its existence, however, this company devoted almost its entire attention to the development of the lucrative fur trade; very few settlers were sent out to the colony, with the result that while over 60 *in extenso* grants of seigniories were made, almost none at all were ever taken possession of by the grantees. But in 1663 the company was compelled to surrender its charter and extensive territorial rights, the Crown taking into its own hands the supervision of colonial affairs and providing New France with a royal government corresponding roughly to that established in the French provinces at home. From this time on settlers came in increasing numbers; power was given the colonial governor and intendant to make grants of seigniories subject to royal ratification, and during the last quarter of the 17th century these were made freely. In no case were grants made to absentees; each applicant for a seigniorial grant had to prove himself a bona-fide colonist. Large numbers of the settlers were sent over at the royal expense and once in the colony, every inducement was given them to remain. Even the detachments of French regular troops sent out to the colony were disbanded there and both officers and men were encouraged, by liberal grants both of land and money, to become permanent residents of New France.

As to the size of the seigniories granted, there was no fixed rule: they varied from small plots containing a few square *arpents* to huge tracts 10 by 12 leagues in area. Much depended on the position occupied by the settler before his immigration to the colony and upon the available means which he had for the development of his grant. But whatever the area of the grants, they almost invariably assumed the same shape,—that of a parallelogram with the shorter end fronting on the river. On receiving his grant the new seignior was under obligation to repair at once to the Château de Saint Louis in Quebec, there to render his fealty and homage to the governor as the representative of the Crown. Within the next 40 days he was required to file with the registrar-general his *aveu et dénombrement,* or statement showing clearly the location, extent, and nature of his seigniory. A similar statement containing full information regarding the development of the holding was required every time the seigniory changed owners. No payment was exacted from the seignior in return for the original grant, but an exaction known as the *quint* became payable on each mutation of ownership by sale, gift or inheritance other than in direct succession. This amounted to one-fifth of the estimated value of the seigniory, but of this amount it was the custom of the Crown to give a rebate of one-third. As the seigniories increased in value very slowly this burden was never an onerous one. In making the grants, the authorities usually reserved the right of taking, from the granted seigniories, such locations as might at any time be found necessary for the construction of fortifications or other public works, such oak and pine timber as might be found suitable for use in the royal shipyards, and the right to a share in all mines and mineral deposits found in the seigniory.

In France the seignior was under no obligation to sub-grant the lands within his seigniory, but by a series of royal edicts—more notably the Edict of Marly (1711)—this obligation was imposed upon the seigniors of New France in the interest of colonial development. From 1711 onwards it was incumbent on all seigniors in Canada to sub-grant portions of the unoccupied lands of their seigniories to any settlers who applied for such grants, on whatever terms were customary in the neighborhood without exacting any bonus or *prix d'entree.* If the seignior refused to do this, power was given the governor and intendant to step in and to make the grant, the seigniorial dues in such case to become payable to the Crown. Furthermore, from time to time various edicts revoked or curtailed the grants made to such seigniors as did not seem to be showing sufficient zeal in having their lands granted to settlers. In this way every seignior was compelled to become, after a fashion, the immigration agent of the coloniel authorities, and it was this particular feature which serves most prominently to differentiate the seigniorial system in Canada from its prototype at home.

Grants made by the seigniors to settlers were called grants *en censive.* These likewise varied considerably in size, but almost invariably assumed the same shape as the seigniory within which they lay. Over them the seignior retained a variety of rights, some financial, some judicial and some merely ceremonial or honorary in their nature. Among the former was the annual payments known as the *cens et rentes,* the former payable in money, the latter usually in produce. The *cens* was a very small due, amounting usually to a few *sous* per superficial *arpent* and valuable to the seignior mainly as establishing his claim to other and more important rights. The *rentes* was payable annually in grain, cattle or poultry but might be commuted by agreement of the parties into a fixed money payment. Then there was the *lods et ventes,* a mutation fine payable at every change of ownership. This amounted to one-twelfth of the mutation price, and of it the seignior usually remitted one-fourth, although he was under no legal obligation so to do. To guard himself against loss of his proper *lods et ventes* through sales of *en censive* holdings at less than their actual value, the seignior possessed the *droit de retraite* by virtue of which right he might preempt any holding thus sold by payment to the purchaser of the mutation price, within 40 days from the date of the sale. Then there was the *droit de banalité* or the exclusive right of the seignior to erect a grist mill within the limits of his seigniory and to compel his *censitaires* to have their grain ground there and not elsewhere on pain of confiscation. The amount of toll receivable for this service was fixed by a royal edict at one-fourteenth of the grain ground. During the greater part of the French régime this incident bore more heavily upon the seignior than upon his *censitaires,* for except in the more populous seigniories, the amount of toll received rarely sufficed to pay expenses. At the same time the colonial authorities compelled the seigniors to provide mills in their seigniories on pain of losing the right for all future time. Finally, there was the much-detested *corvée,* or right of the seigniors to exact from their *censitaires* a certain quota of labor on the seigniorial lands without compensation. The amount allowable varied in different seigniories but as a rule the *censitaires* were permitted to commute it into a fixed money payment. An ordinance of the superior council in 1716 forbade the exaction of *corvée* during seed time and harvest. In addition to the foregoing main rights the seignior ordinarily reserved for

himself the privilege of taking from the lands of the *censitaires* such wood and stone as might be found necessary in the erection of the seigniorial manor house, mill or church, and in some cases the right of taking wood for fuel. In many cases he likewise reserved the right of claiming a share in all the fish caught by his *censitaires* in the waters of the seigniory.

Most of the seigniors possessed certain judicial rights. These, however, were not inherent in the ownership of a seigniory, but were specifically granted by the Crown. This grant might convey merely the right of *basse justice* in which case the seignior was empowered to deal with minor causes in which the amount in dispute did not exceed a few *sols*. The grant of *moyenne justice* gave him a large jurisdiction, while the grant of *haute justice* gave full judicial power in all cases except those such as treason and counterfeiting in which the Crown was directly concerned. As a rule all three degrees of judicial power were conferred on the seignior. But in every case an appeal lay to the royal courts of the colony. As the exercise of his judicial powers brought the seignior very little profit the seigniorial courts never became a very important element in the colonial judicial system.

The remaining rights of the seignior were merely honorary and afforded him no financial return. He was entitled to the fealty and homage of his *censitaires,* to a front pew in the parish church, to certain precedence at the sacraments, to the erection of a Maypole at his door each May Day and, in general, to the respect and deference of his dependents. A number of seigniors who showed zeal in the development of their holdings received patents of nobility but it must be borne in mind that the possession of a seigniory in New France did not of itself give noble rank. Herein Canadian feudalism again differed from its prototype in France. The French seignior was always a noble; the Canadian very rarely.

At the close of the French régime nearly 8,000,000 *arpents* of land had been granted out to be holden under the seigniorial tenure. The system had become so deeply rooted in the colony that the English authorities, after the conquest, did not venture to take the drastic step of supplanting it in favor of the English system of tenure in free and common socage. The old system was allowed, therefore, to remain intact, but as the colony became more thickly settled many of the seigniorial exactions became burdensome. The *droit de banalité* became especially so. Moreover, the new English courts failed utterly to afford the *censitaires* that protection against the seigniors which the authorities of the old régime had given. From time to time the legislature of Lower Canada sought to deal with the growing complaint that the operation of the system was retarding the development of the province but found it extremely difficult to devise any plan which would be satisfactory to the tenants and at the same time protect the vested interests of the seigniors. In 1825 an act was passed giving to the parties concerned the right to commute all seigniorial dues into a lump sum by mutual agreement but very few took advantage of the legal permission thus accorded. It was not until 1854 that by the Seigniorial Tenures Abolition Act a general scheme for the compulsory commutation of all seigniorial obligations received the assent of the Canadian legislature. This act provided for the establishment of a special court to determine just what seigniorial claims were justifiable and on a basis of its decisions each seignior was awarded a certain indemnity for the loss of his rights. Part of the amount was paid him from the public treasury; the balance became an annual rent charge on the lands of the tenants, which annual charge, again, might be commuted into a lump sum if the tenant so desired.

As a matter of fact relatively few of these *rentes constituées* were commuted, and for nearly a century they continued to be paid, although with more or less grumbling. Various schemes for extinguishing the annual rents by means of aid from the public treasury were broached from time to time, but not until a series of enactments culminating in the Seigniorial Rent Abolition Act passed by the provincial legislature in 1941 (S.R. Québec, 1941, Chapitre 322) was this problem solved. The arrangements made by this statute are somewhat complex, but in general they provided for the organization and incorporation of "syndicates" with power to borrow on the credit of the Province and to use such funds for the commutation of the constituted rents by payments capitalized at six per cent. Repayments to the syndicates out of local taxes are spread over a term of years.

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SEIGNORY, or **SEIGNIORY**, (1) in English law, the lordship retained by a grantor after alienation of land in fee simple, and regarded as an incorporeal hereditament. The seignory dates back to Roman times, and later found its way to England, where the only seignories now existing are those created before 1290. By a statute passed in England in 1882, a tenant for life of a manor may alienate the seignory of any freehold land within such manor. The lordships of manors are the only seignories of consequence today in England.

(2) In Canada, land held by a tenure resembling that of feudal times; also, a seignor's mansion. See Seigniorial Tenure.

SEINE, sān, the Sequana of the Romans, an important river of France. It rises in the Plateau of Langres, 1,545 feet above the sea, some 18 miles northwest of Dijon. From this site, marked with the statue of a water nymph, it flows in a northwesterly direction to the English Channel, some 250 miles distant, although its winding course has a length of 482. Shorter than the Loire or the Rhone, and inferior in volume, the Seine maintains a steadier flow with an average discharge of more than 10,000 cubic feet a second. Disastrous floods have sometimes occurred, however, for in January 1910 water

levels rose 24 feet in Paris. The Seine has many branches. From the south the most important is the Yonne; from the north the Marne, 30 miles longer than the upper Seine, and the Oise. Below Paris the river winds through a pleasant countryside by a series of broad loops and empties into the sea by a long estuary impeded by extensive sand bars. Several important French cities owe their existence to the Seine; the port of Havre at the mouth, historic Rouen with its fine cathedral, and Paris, the heart of the country. Here an island in the channel marked the first settlement, and here the river is crossed by many artistic bridges. The Seine and its tributaries provide a maze of busy waterways. Ships of 20-foot draught ascend to Rouen, and smaller vessels to Paris. Curious phenomena of the lower river are the tidal bores, several feet high, which sweep inward from the sea, and here the banks are protected by dykes. Canals, designed for barges, give access to the Loire, the Rhone, the Rhine, the Meuse, and the Scheldt. The valley is of great historic interest and several tributaries, notably the Marne and the Aisne, were marked by bloody conflicts during World War I.

SEIPEL, zī'pĕl, **Ignaz,** Austrian statesman and Catholic priest: b. Vienna 1876; d. Aug. 2, 1932. Educated at Vienna University, he held professorships at Salzburg 1909–1912 and Vienna 1917–1918; became minister of public works 1918 and leader of the Christian Socialists in the Assembly, 1919. In 1922 he succeeded Johann Schober as state chancellor, but resigned in 1924 owing to strong opposition. On June 1, 1924 he was shot and seriously wounded by a young Socialist. In October 1926 he again became Chancellor and, in addition, foreign minister. He did great work in restoring the shattered finances of the country and introducing internal reforms. Author of *The Economic Teaching of the Fathers* (1909); *State and Nation* (1916).

SEISIN, *in law,* (1) possession of land by one claiming a freehold therein; also, the land so possessed. The possession must be actual and by a person entitled to the land or by one claiming a freehold interest therein. If the person having possession is disseized by one who intends to hold the freehold, either with or without legal right, the freehold is thereby transferred to the disseizor. Actual possession is known as "seisin in deed," while a right of present possession is known as "seisin in law."

(2) The ceremony accompanying the delivery of possession of land held in freehold: in this sense often called "livery of seisin."

SEISMOGRAPH, sīs'mō-grăf, or **SEISMOMETER,** an instrument for recording the period, extent and direction of each of the vibrations which constitute an earthquake. For a complete seismograph, three distinct sets of apparatus are required: (1) To record horizontal motion; (2) to record vertical motion; and (3) to record time. The horizontal and vertical motions must be written on the same receiver, and if possible side by side, while at the instant at which the time is recorded a mark must be made on the diagram which is being drawn by the seismograph. The first instruments were merely modifications of the seismoscope (q.v.), but successive improvements have been introduced, and the seismograph has been brought to a high pitch of perfection. Some of the best, if not the best, forms known are in use in the Imperial Observatory at Tokio, Japan. Milne's pendulum seismograph is a common form. This has a horizontal pendulum, swinging like the boom of a schooner. At the movable end of the pendulum is a box with a light which shines through the hollow pendulum rod, coming out through slits. By an ingenious mechanism any trembling of the light coming through the slits is recorded on a band of paper passing over a slowly moving timed cylinder. The Marvin seismograph, used by the Weather Bureau at Washington, employs a pendulum pointing upward, as in a metronome. The balance mechanism is of exceeding delicacy, and the mounting of the instrument is extremely solid to protect it from local vibrations. The record is taken on a traveling paper band in the ordinary manner.

SEISMOLOGY, sīs-mŏl'ō-jĭ, that branch of physical science which is concerned with the study and investigation of the phenomena of earthquakes, their causes and effects, their distribution, and the various circumstances attending their occurrence. Its pursuit is regarded as of the utmost importance to geological and other forms of terrestrial research. Seismology, however, is not limited to the study of earthquakes in the usual restricted sense, but deals with related phenomena occurring under many and differing aspects. According to leading authorities, it should investigate minute movements or tremors of the earth which escape ordinary observation; pulsations of the earth which, by reason of the length of their period, are not noticed; and oscillations, or elevations and subsidences of the earth which slowly alter the relative land and sea levels. Seismology has been developed almost wholly since the beginning of the 19th century, and must still be regarded as in the early stages of its progress; but already it has a great and growing body of materials and of literature, and its possibilities seem to point to the application of the science in practical ways. One of these, it is confidently predicted, will be the warning of dwellers in seismic regions when earthquakes impend. See also EARTHQUAKE.

SEISMOSCOPE, the earliest and simplest form of earthquake recorder. The first known was invented by a Chinese named Choko, in 136 A.D., and shows the occurrence and direction of an earthquake by the fall of a column, a principle which was afterward independently adopted in the West. Vessels filled with viscid liquids have been used; the height to which the liquid is washed up the side of the vessel being taken to indicate the intensity, and a line joining the points of maximum motion to denote the direction of an earthquake. Palmieri's seismoscope consists of horizontal tubes turned up at the end, partly filled with mercury. To intensify the motion of the mercury, small floats of iron are placed on the surface, attached by threads to a pulley provided with indices moving in front of a scale of degrees, whence the intensity may be read off. The direction is determined by the azimuth of the tube giving the maximum indication, several tubes being placed in different azimuths. Pendulum seismoscopes,

both swinging and fixed, have also been employed. See SEISMOGRAPH.

SEISTAN, sās-tän, or **HAMUN, Lake,** Afghanistan, a large, irregularly-shaped, shallow lake or swamp on the western frontier adjoining the Persian province of Khorassan; a division of this province is named Seistan after it. The lake is not a single expanse of water, but is divided into three depressions. A great part of the area is generally dry; but, as the basin has no outlet, when the Helmund and its other feeders are in flood this lake regularly overflows its boundaries, fertilizing large tracts of country. The great variations in the size of this remarkable salt water lake give it a peculiar interest. The rainfall of the region is usually not over three inches, and in the spring a few pools only mark the seistan area. But as the depression here is 1,000 feet below sea level, it attracts the drainage of some 125,000 square miles, so that at times the lakes or chain of lakes is quite extensive. A sufficiency of grain is easily grown to support the population — over 200,000. There is an abundance of water-fowl, living in the vast reed-beds of the salt marsh.

SEITZ, sīts, **Don Carlos,** American newspaper manager: b. Portage, Ohio, 24 Oct. 1862. He was graduated at Liberal Institute, Norway, Me., in 1880. He was city editor of the Brooklyn *Eagle* in 1889–91; was later connected with the New York *Recorder* and with the Brooklyn *World;* advertising manager 1895–97, business manager 1898–1923, New York *World;* manager *Evening World,* 1923–26; associate editor *Outlook,* 1926–27; associate editor *Churchman* from 1929. Among his writings are 'Surface Japan'; 'Whistler Stories'; 'Joseph Pulitzer'; 'Uncommon Americans'; 'The James Gordon Bennetts.' He died 4 Dec. 1935.

SEIXAS, sĕk'sąs, **Gershom Mendes,** American patriot and minister: b. New York, 14 Jan. 1745; d. there, 2 July 1816. He was a son of a refugee from Lisbon (who settled in New York about 1730), and choosing the Jewish ministry as his profession in 1766 was placed in charge of the Spanish and Portuguese Synagogue of his native city. On the outbreak of the Revolution he espoused the American cause, closing the synagogue rather than continue it under British rule. While the majority of his people went to Philadelphia he settled in Stratford, Conn., until in 1780 he was asked to organize a synagogue in Philadelphia, the «Mikve Israel,» where he continued to display his patriotic zeal. Owing largely to his efforts on 23 Dec. 1783 a modification in the test clause in the Pennsylvania constitution was made, whereby Jews were subjected to no disqualification for office. After the evacuation of New York in 1784, the old synagogue was re-established and Seixas resumed his former charge. In 1787 he was appointed one of the trustees of Columbia College, holding the office uninterruptedly until 1815. When Washington was inaugurated in 1789 Seixas was selected as one of the ministers to take part in the ceremonies.

SEJANUS, sĕ-jā'nŭs, **Lucius Ælius,** son of a Roman knight, and favorite of Tiberius: b. Vulsinii in Etruria; d. Rome, 31 A.D. In 14 A.D. he was made commander of the Prætorian bands, and acquired the confidence of the suspicious Tiberius, to such an extent as to govern him completely; while the servile senate paid complete deference to the powerful favorite, the prætorian cohorts were also favorable to him, and there was no obstacle in the way of his attaining the supreme power he aimed at but Drusus, son of Tiberius, and the sons of Germanicus, Drusus and Nero, the nearest of kin to the emperor. Drusus was put out of the way by poison; the latter, with their mother, were banished and thrown into prison, a step which they did not long survive. Several friends of Germanicus were beheaded at the instigation of Sejanus; and when Tiberius finally retired from Rome, and withdrew from the government, Sejanus governed with absolute power, and the senate ordered that the statues erected in his honor should be publicly worshipped. But at the moment of his highest elevation the suspicions of Tiberius were awakened, and his measures were taken so cautiously, that Sejanus suspected nothing until openly accused by the emperor before the senate. He was then imprisoned, condemned to death, and executed on the same day. The historian Tacitus has given a searching and vivid, although possibly a prejudiced, account of the character and intrigues of Sejanus, while his fate is the subject of a tragedy of Ben Jonson's. Consult Tacitus, 'Annals' (iv, 1, 2, 3, 8, 39ff.; 74, and v, 6ff); Suetonius, 'Tiberius'; Jülg, 'Vita Lucii Ælii Sejani' (Innsbruck 1882); and Tarver, J. C., 'Tiberius the Tyrant' (New York 1902).

SEKAKUL, an African parsnip (q.v.).

SEKI KOWA, sā'kē kō'wą, or **SEKI SHINSUKE KOWA,** or **TAKAKAZU,** Japanese mathematician: b. Fujioka, near the present Tokio, province of Kōzuke, 1642; d. near there, 1708. He was of the samurai class and became the greatest mathematician of his time in Japan, benefiting, however, by the work of several great Japanese mathematicians immediately preceding him, among whom was Yoshida. He was famous both as a teacher and for his discoveries, and his work greatly improved the algebra of the Japanese, which had come to them from the Chinese. He understood the native calculus, *yenri,* which he may have invented; and also knew the principle of determinants. Most of his manuscripts are lost. Consult Mikami, Y., 'Development of Mathematics in China and Japan' (1913); and Smith, D. E., and Makimo, Y., 'A History of Japanese Mathematics' (1914).

SELACHII, sē-lā'kĭ-ī, the order of fishes now known more generally as the *Elasmobranchii,* which includes the sharks, rays and their allies. See ICHTHYOLOGY; SHARKS, ETC.

SELAGINELLA, sę-lăj-ĭ-nĕl'ą, club moss, a genus of mostly tropical plants with small scale-like leaves and propagated by spores. (See FERNS AND FERN-ALLIES). The species are very numerous, and widely distributed in warm regions. They are generally quadrangular, the two lower rows of small one-veined leaves larger than the upper two rows, thus giving a flattened look to the fronds. They are generally creeping plants, often forming moss-like mats of foliage, but in some species supported by other plants, are erect and often several yards long. Selaginellas are cultivated in green houses both as pot plants, for edgings, and for hiding bare earth,

with their verdant foliage, sometimes iridescent, or changing in hue. *S. lepidophylla,* a Mexican species, growing in flat rosettes, while not very beautiful, is one of the familiar resurrection plants, because it becomes desiccated in time of drought and revives when moist conditions return. When dried out, it rolls its branches inward forming a ball, in which condition it is blown to a new situation by the wind.

SELAH, sē'lȧ, a Hebrew word which occurs 71 times in the Book of Psalms and three times in the prayer of the prophet Habakkuk (Hab. 3), and is retained in the English authorized version of the sacred texts; in the Septuagint version it is represented by the word *diapsalma.* Its signification cannot be definitely ascertained, but commentators interpret it variously as indicating either a pause or repetition, or the end of a strophe, or playing with full power, or a short recurring symphony, or, finally, a bending of the body in reverence.

SELANGOR, sĕ-lăng'ẽr, one of the states of the Federation of Malaya, on the west coast of the Malay Peninsula. It is bounded on the north by Perak, on the east by Pahang and Negri Sembilan, and on the south and west by the Strait of Malacca. The area is 3,160 square miles, and the population numbers (1950 est.) 776,182. The coastline is some 100 miles in length, and the state extends inland a distance of almost 50 miles to the north-south mountain range of the Malay Peninsula. All the rivers are short; the principal ones are the Selangor, the Klang, and the Langat. Kuala Lumpur (pop., 1950, 225,000), the capital, lies 200 miles northwest of Singapore, on the main west coast railway line up the peninsula; the most important city in Malaya after Singapore, it is also the capital of the Federation of Malaya. From Kuala Lumpur a branch line of 27 miles runs to Port Swettenham, the state's seaport and chief port of the federation; on that line is Klang (pop., 1947, 33,506), an important rubber-planting center. Other towns include Kajang (pop. 6,000), 10 miles south of Kuala Lumpur, another rubber center; and Kuala Kubu (pop. 5,500), 25 miles north of the capital, whence a highway runs northeast into Pahang. Alluvial tin mining and rubber cultivation are the major industries of Selangor. Coal is also mined in the northeast end of the state, and coconuts, rice, and pineapples are cultivated on a considerable scale. Because of an attack upon Malacca, the Dutch drove the sultan of Selangor from his state in 1784, and eventually he was forced to acknowledge their suzerainty. With Dutch evacuation of Malaya, British influence became paramount, and in 1818 the sultan made a commercial treaty with the British governor of Penang. The state was placed under British protection in 1874, and it became one of the Federated Malay States in 1895. When the Federation of Malaya was formed in 1948 Selangor constituted one of its leading political units.

SELBORNE, sĕl'bôrn, **Roundell Palmer,** 1st earl of, English jurist and hymnologist: b. Mixbury, Oxfordshire, Nov. 27, 1812; d. Petersfield, Hampshire, May 4, 1895. After graduating at Christ Church, Oxford University, in 1834, he studied law and was called to the bar in 1837; in 1849 he became a queen's counsel. From 1847 until 1857 he was member of Parliament for Plymouth, and in 1861 he was elected to the House of Commons for Richmond, Yorkshire, thereupon becoming solicitor general in the Cabinet of Lord Palmerston and receiving a knighthood. As attorney general from 1863 to 1866 he was adviser to the British government on matters arising from the American Civil War. In 1872 he entered the Cabinet of William Ewart Gladstone as lord chancellor, being made Baron Selborne; his most important work in this office was to ensure passage of the Judicature Act through Parliament the following year. He lost this office with the fall of the Gladstone government in 1874, but resumed it when the Liberals again returned to power in 1880. In 1882 he received an earldom, but in 1885 he severed his connection with the Liberals because of differences with Gladstone on the issue of home rule for Ireland. A prominent Anglican churchman, he edited a hymnal entitled *The Book of Praise* (1863) and wrote works on church questions: *Notes of Some Passages in the Liturgical History of the Church of England* (1878); *Ancient Facts and Fictions Concerning Churches and Tithes* (1888).

SELBORNE, William Waldegrave Palmer, 2d Earl of, British statesman: b. 1859; d. London, Feb. 26, 1942. The eldest son of the 1st earl of Selborne, as Viscount Wolmer he was elected to the House of Commons in 1885. He supported the Conservative Party, and in 1895 he was appointed undersecretary for the colonies in the administration of the marquis of Salisbury. In 1900 he was given a seat in the Cabinet as first lord of the admiralty, and this office he gave up in 1905 to become high commissioner for South Africa and governor of the Transvaal and Orange River colonies. Serving in South Africa until 1910, he played a prominent part in facilitating the attainment of responsible government by the two new colonies and the establishment in 1910 of the self governing Union of South Africa. In 1915, during the early stages of World War I, he entered the coalition Cabinet as minister of agriculture, but the following year he resigned the office because of his opposition to the policy respecting Ireland of Prime Minister Herbert Henry Asquith. Like his father, to whose earldom he had succeeded in 1895, he was prominent in Anglican Church affairs.

SELBORNE, village, England, in the County of Hampshire, 52 miles south of London, known as the birthplace of Gilbert White (q.v.), author of the celebrated *Natural History and Antiquities of Selborne* (1789). The Selborne Society, for the preservation of plants and birds, was founded in Gilbert White's memory in 1885. White was buried in the churchyard at Selborne, of which he was curate; his house, "The Wakes," has been preserved.

SELBY, urban district England, in the county of West Riding, Yorkshire, on the Ouse 13 miles south of York. A Benedictine abbey was founded there in 1069 by a grant of William the Conqueror, and subsequently became of considerable importance. The abbey's Church of Saint Mary and Saint German, in several architectural styles, has been in part preserved. Selby is supposed to have been the birthplace of King Henry I. Pop. 10,064.

SELDEN, John, English jurist, antiquary,

Orientalist, and statesman: b. Salvington, Sussex, Dec. 15, 1584; d. London, Nov. 30, 1654. After studying at Oxford University he removed in 1602 to London and became a student of law at Clifford's Inn. In 1612 he was called to the bar at the Inner Temple. He formed friendships with some of the most learned men of the time, William Camden and Ben Jonson among the number, and he appears to have been one of the number frequenting the Mermaid Tavern, in Cheapside, home of the Mermaid Club, famous as the supposed meeting place of leading wits. His *Duello, or Single Combat* (1610) and some legal writings were followed by *Titles of Honour* (1614), a work of permanent value, and *Analecton Anglo-Britannicon* (1615)), a history of civil government in Britain before the Norman Conquest. With publication of *De Diis Syriis* (1617), a study of polytheism, he attained a European reputation as an outstanding Orientalist, and this was enhanced by treatises on rabbinical law. Great controversy arose among the English clergy with appearance of his *History of Tythes* (1618) which, while admitting their legal, denied their divine, right. The work was suppressed and Selden was brought before the Privy Council and made to renounce his views. He was believed instrumental in getting Parliament to deny in 1621 that it owed its rights and privileges to the crown, and for this he was imprisoned in the Tower of London. First elected a member of the House of Commons in 1623, and reelected in 1626 and 1628, he labored zealously for the advancement of civil and religious liberty. He supported the impeachment in 1626 of George Villiers, 1st duke of Buckingham, and two years later he helped draft the Petition of Right (q.v.) and spoke in support of it in the House of Commons. In 1629 he was once more sent to the Tower, on this occasion for his part in securing the resolution in the House against the levying of tonnage and poundage. Released a year later, he ceased political activity for a while and turned again to writing. He wrote *De Successionibus in Bona Defuncti Secundum Leges Hebraeorum* (1634) and *Mare Clausum* (1635); the latter, a reply to the *Mare Liberum* of Hugo Grotius, was dedicated, strangely enough, to King Charles I. These works were followed by *De Successione in Pontificatum Hebraeorum Libri Duo* (1638) and *De Jure Naturali et Gentium juxta Disciplinam Hebraeorum* (1640). In 1640 he was elected to the famous Long Parliament (q.v.) as one of the members for Oxford University, and there, the next year, he assisted in drafting the articles of impeachment of Archbishop William Laud. He took part as a lay member in the Westminster Assembly of divines, endeavoring to moderate the fanaticism, and shortly thereafter he was appointed keeper of the rolls and records of the Tower of London. Other writings at this period of his life included *Privileges of the Baronage of England* (1642), *Dissertatio de Anno Civili et Calendario Reipublicae Judaicae* (1644), and *Uxor Ebraica* (1646). He is best remembered, however, for his *Table Talk* (1689), reports of his utterances over 20 years compiled by his amanuensis, Richard Milward.

SELDES, sĕl'dĕs, **George,** American journalist and writer: b. Alliance, N. J., Nov. 16, 1890. He attended East Liberty Academy, Pittsburgh, Pa., and, during 1912–1913, Harvard University. After experience as reporter for the Pittsburgh *Leader* (1909–1910), night editor of the Pittsburgh *Post* (1910–1916), and managing editor of *Pulitzer's Weekly* (1916), he was a war correspondent with the American forces in France during World War I. In 1920 he was made head of the Berlin bureau of the Chicago *Tribune,* and in 1925 was transferred to the Rome bureau. From 1928 he devoted himself to writing. His first book was *You Can't Print That!* (1929), recording his varied experiences in parts of Europe, Asia, and North Africa, and volumes which followed included *The Truth Behind the News* (1929); *Sawdust Caesar* (1932), an attack on the Mussolini regime in Italy; *Iron, Blood, and Profits* (1934); *Freedom of the Press* (1935); *You Can't Do That* (1937); *Lords of the Press* (1938); *The Catholic Crisis* (1939); *Witch Hunt* (1940); *Facts and Fascism* (1943); *1000 Americans* (1947). From 1940 he edited *In Fact,* a weekly newsletter which obtained a wide circulation.

SELDTE, zĕl'tĕ, **Franz,** German politician: b. Magdeburg, June 29, 1882; d. Nürnberg, April 1, 1947. He studied chemistry at the Braunschweig technical high school, and on outbreak of World War I in 1914 he went on active service with the 66th Infantry Regiment. In 1916 he lost his left arm in the Battle of the Somme. Shortly after the Armistice in 1918 he founded the Stahlhelm (Steel Helmet), a semimilitary nationalistic movement, and he remained head of the organization until Adolf Hitler ordered it dissolved on Nov. 7, 1935. Meanwhile, in 1933 Hitler had appointed him minister of labor in the first Nazi Cabinet, and he retained this post until the complete collapse of the regime in 1945, surviving the vicissitudes which had swept older party members from favor. He continued as the labor minister of the German Reich in the regime of Admiral Karl Doenitz which succeeded that of Hitler. After the close of hostilities he was arrested by the Allies as a possible war criminal in connection with the use of slave labor in Nazi war industry, and was put in jail in Nürnberg. He died in an American Army hospital while awaiting trial.

SELECTION, a term in biology used in several different senses, all having reference to the process of evolution or the production of types of individuals. Artificial selection is the process which is used by breeders of animals to produce special types and qualities. See also Evolution, Theories of.

SELECTIVE SERVICE. See Conscription.

SELECTMEN, a name used in New England towns to designate executive officers corresponding to the aldermen of a city. Although customs vary, there are usually three to nine selectmen; they are elected for from one to three years. They carry out the behests of the town meetings and have minor appointive powers. The practice of choosing selectmen is found in Massachusetts as early as the issue of the *Body of Liberties.* See also Town and Town Meetings.

SELENE. See Luna.

SELENGA, sĕ-lĕng-gä', **river,** Asia, rising near Dzhibkhalantu, in western Outer Mongolia, flowing east and north through Mon-

golia and the Russian Transbaikal district, and emptying into Lake Baikal near its southern end. It is 750 miles long, and navigable for light vessels to its junction with the Orkhon. It receives through the Egin-kol the overflow of the large Lake Kosso-gol. The Selenga is the main headstream of the Angora, the principal tributary of the Yenisei.

SELENITE, the crystallized or distinctly foliated variety of the mineral gypsum, hydrous calcium sulphate. It is number two in the scale of hardness, is flexible, but when broken has a «fibrous fracture» which consists of two imperfect cleavages. When pure it is colorless and transparent. The cleavage plates have a pearly lustre which is characteristic of the clinopinacoid while the other faces of the crystal are subvitreous. Plates of selenite several feet across and perfectly transparent are not uncommon, while crystals five feet in length have been found in Utah. Fine large crystals are also found in Italy, France and Switzerland. Limpid crystals of matchless beauty occur in the Sicilian sulphur mines. Twin crystals are common in all these localities, the most typical of which are the «fish-tail» twins. Foliated selenite is abundant in Nova Scotia, also at Lockport and elsewhere in New York. while crystals of model-like perfection are found near Ellsworth, Ohio. Like massive gypsum, selenite is an exceedingly common mineral. It has been used to some extent as a filler for paper, paints, etc.

SELENIUM, symbol Se, atomic weight 79.2. It was discovered by Berzelius (1817) in the refuse of a sulphuric acid factory. A non-metallic element occupying an intermediate place between sulphur and tellurium. Occurs in the free state in small amounts usually associated with native sulphur. Found in many minerals combined with various metallic elements as copper, lead, mercury, silver, etc. Here again the compounds of selenium are found in company with the analogous compounds of sulphur. Free selenium is prepared from the compounds of selenium found in the dust depsited in the furnace flues where sulphides are burned in the manufacture of sulphuric acid. This is oxidized to selenius acid (see below) which upon treatment with sulphurous acid gives selenium.

It is found that there occurs a remarkable variation in the electrical resistance of selenium as the intensity of the light which falls upon it is varied; when the light to which selenium is exposed is increased in intensity, the electrical resistance is diminished. It is this principle that is the basis of the «Selenium Photometer» of astronomy, an instrument of extreme delicacy by which the variations in intensity of the feeble light of the stars can be measured with an accuracy which is unapproachable by any other means.

Selenium exists in two allotropic forms. The one obtained as above is a red amorphous powder soluble in carbon di-sulphide, while if this powder be melted and again cooled suddenly to 210° C. it forms a dark vitreous mass insoluble in carbon di-sulphide. Crystalline forms are also known.

In general chemical behavior it is closely related to sulphur and tellurium, all three forming analogous oxides, oxygen acids and hydrogen compounds.

Selenium Dioxide, SeO_2 a white crystalline compound formed when selenium is burned or by healing selenious acid. It dissolves readily in water forming selenious acid.

Selenious Acid, H_2SeO_3, a crystalline solid found by oxidation of selenium in presence of water, as above. It is a di-basic acid forming salts called selenites having the general formula M_2SeO_3.

Selenic Acid, H_2SeO_4, a heavy liquid resembling sulphuric acid and formed by action of powerful oxidizing agents on selenium or selenious acid. It differs from sulphuric acid in being unstable, losing its oxygen readily and thereby passing to selenious acid. Also a di-basic acid forming salts called selenates (M_2SeO_4).

With hydrogen selenium forms a very disagreeable smelling gas called seleniuretted hydrogen (H_2Se), the analogues of sulphuretted hydrogen. Selenium forms compounds with many metallic elements (see above) called selenides. These are analogous to the sulphides and usually occur along with them. They may be made by heating selenium with the metal.

SELENODONT TEETH, a type of molar teeth, characteristic of modern herbivorous animals, on which the crown of the tooth exhibits curving ridges of enamel instead of rounded tubercles. See BUNODONT.

SELENSULPHUR, an orange- to brownish mineral consisting of sulphur and selenium. It is a result of volcanic action, and occurs as an incrustation in the islands of Lipari, Vulcano, Hawaii and Japan. The name is often improperly applied to orange-yellow crystals of native sulphur from Sicily.

SELEUCIA, sĕl-ū′sĭ-ą, Asia, the name of several cities founded by Seleucus Nicator. (1) The most celebrated was SELEUCIA-ON-THE-TIGRIS, made the capital of Babylonia in place of Babylon, from which it was distant about 30 miles, and which it eclipsed in wealth and splendor. The Tigris and Euphrates flowed near its walls, and rendered it one of the richest commercial cities of ancient times. The number of its inhabitants at the time of its greatest prosperity is estimated to have been about 600,000, chiefly Greeks. During the decline of the Seleucidæ monarchy it became independent, and from its great wealth became the centre of attraction to the pillaging tribes of southern Armenia and Media, by whom it was partially plundered several times. In 116 A.D. it was burned by Trajan, and a few years later its destruction was completed by Lucius Verus, the Roman emperor. From that time it was deserted and became as desolate as Babylon itself. (2) Another important city, SELEUCIA PIERIA, founded in 300 B.C., was situated in the seacoast at the foot of Mount Pieria, 12 miles west of Antioch. Its natural strength was improved by every known art of fortification, and this combined with its magnificent buildings obtained for it a distinguished position among the great cities of antiquity. It occupied a very prominent place in the wars between the Seleucidæ and the Ptolemies, but it rapidly declined under the Roman dominion, and in the 6th century of our era the city had fallen into complete decay. (3) SELEUCIA TRACHEOTIS, a city of Cilicia on the Calycadmes, was also built

by Seleucus. It was once a rival of Tarsus, and on its site are many ancient ruins. The modern Selefke is located here. (4) SELEUCIA, a city in Persia, was founded by Alexander the Great and called Alexandria. It was rebuilt as Seleucia by Antiochus I of Syria. Among the other cities of the name were Seleucia in Mesopotamia on the Euphrates; on the Belus in Syria; in the Pisidia; and in Pamphylia.

SELEUCIDS, sē-lū'sĭds, a dynasty (312–64 B.C.) founded in Syria by Seleucus I, one of the ablest generals of Alexander the Great (r. 336–323 B.C.) and a successor to a large part of his divided empire. Seleucus I Nicator (r.312–280 B.C.) received in 321 as his share the satrapy of Babylon, from which he conquered eastward (311–302 B.C.) as far as the Indus. Consequent to his victory at Ipsus (in Great Phrygia, 301 B.C.) over Antigonus I (r.306–301 B.C.), king of Macedonia and another general and successor of Alexander, he added Syria and eastern Asia Minor. In northern Syria he established Antioch, so named after his father, which became the capital of the kingdom. He also founded several cities named Seleucia after himself, chief among which was Seleucia-on-the-Tigris, which served as the capital of the eastern satrapies. These cities were peopled by Macedonian and Greek colonists, enjoyed civic independence, and developed into important centers for the diffusion of Greek language and culture. Educated Syrians began to study Greek and write in it, but the countryside retained its old speech and its way of life. Next to colonization, the establishment of a standard calendar for western Asia was perhaps the greatest achievement of the period. The year 312 B.C. is reckoned as marking the birth of the Syrian monarchy and the starting point of the Seleucid era. The era, called Greek by Syrians and Jews, began October 1 and is still in limited use today.

The kingdom established by Seleucus was hardly ever at rest. His immediate successors Antiochus I Soter (r.280–261 B.C.) and Antiochus II Theos (r.261–247 B.C.), fought indecisively against Ptolemy II Philadelphus (r.285–246 B.C.), king of Egypt and son of another general and successor of Alexander, for the possession of Palestine. Antiochus III the Great (r.223–187 B.C.) reconquered the Iranian territory as far as India and carried Seleucid arms almost to the Egyptian border. But his attempt to conquer Greece brought him into conflict with Rome, to which he was forced to cede all the territory beyond the Taurus Mountains and to pay a heavy war indemnity. In his wars he made effective use of the elephant. This animal became a Seleucid emblem and figured on the coins. Apamea-on-the-Orontes (Afāmiyah, Qal'at al-Maḍiq) served as a depot where war elephants, mostly imported from India, were bred and trained.

Of the remaining sovereigns—there were about 26 in all—one of the best known was Antiochus IV Epiphanes (r.175–163 B.C.), whose invasion of Egypt (169 B.C.) resulted in the occupation of its lower part. As an enthusiastic champion of Hellenism, he tried to impose its culture upon his subjects, particularly the Jews of Palestine, thus provoking the Maccabean revolt (?166 B.C.). The spoils of the Temple of Jerusalem helped to finance his lavish program of public buildings. Among his successors Antiochus V Eupator (r. 163–162 B.C.) was feeble and corrupt; Alexander Balas (r.150–145 B.C.) was dissolute; and Demetrius II Nicator (r.145–138, 129–125 B.C.) could not hold his own against the Parthians. Antiochus VII Sidetes (r. 139–129 B.C.) restored the royal line and carried on war against the Jews, who were enjoying a period of independence under the Maccabees (165–134 B.C.). So weak had the Seleucid state become that Tigranes, king of Armenia (83–69 B.C.), ventured to invade Syria and penetrated (69 B.C.) as far south as Acre (Ptolemais). Five years later Pompey the Great (106–48 B.C.), the Roman general, appeared on the scene, overthrew Antiochus XIII Asiaticus (r.69–64 B.C.) and organized Syria into a Roman province. By that time Bactria, Parthia, Armenia, and Judaea had been lost.

Syria was the backbone of the Seleucid kingdom. Syrian trade, both domestic and foreign, was of great consequence to the entire realm and to its population. It was the Seleucid policy to promote commercial relations with the Graeco-Roman world. The main inland highways were guarded by chains of strong colonies, which also provided adequate halts for the caravaneers. Dura-Europos, founded c.300 B.C. by Seleucus I on the desert road between Syria and Mesopotamia, was such a colony and soon developed from a strong fortress to an important emporium.

The political institutions of the Seleucid realm were a strange mixture of Greek and Near Eastern elements. The king not only enjoyed absolute power, but also was surrounded by a divine halo of Oriental origin. Some of the late kings, like Balas (from Ba'l, lord [name of a deity]), assumed Semitic titles. The language of the court was, of course, Greek. Both army and navy were the king's. In its early stages the army consisted of Macedonians and Greeks recruited from the realm. Its nucleus was the phalanx. While the fleet at no time played a decisive part in any of the recorded battles, yet it performed a useful function in cooperating with the active army and in protecting military transport; it was manned mostly by Phoenicians.

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SELF-CONSCIOUSNESS, the conscious recognition that one is an ego or personality: distinguished from consciousness (q.v.). In the article in this encyclopedia on consciousness, it is treated from the material point of view. Self-consciousness here will be treated from the occult or Eastern viewpoint. Each one of us is conscious of himself as an identity or unit, different from every other individual. We know this as fundamentally as we know anything, and while we cannot prove to any of our five senses just what this identity is, this does not militate against the fact of its being a truth. The five senses inform us of material outside things, which science has catalogued and philosophy reasoned upon; but self-consciousness comes to us as an intuition, being recognized in the same way as that which we call conscience, which may be defined as a phase of self-consciousness. It is characteristic of this

self-consciousness that it instinctively knows right from wrong, and thus tends to a recognition of morality as the way of evolution. That the consciousness of all men is in a stage of evolution is easily reasoned out. The babe has a very dim consciousness, and hence little responsibility. The drunkard or dope fiend has reduced his consciousness, and we hold him to be little accountable for what he does under such conditions. The wise man is one who has opened his consciousness to a great many things, and we expect much more of such a one and hold him to a much higher responsibility. It is not too much to say that the destiny or forward movement of the race seems to rest mainly with its wise men, those who are wise in morals as well as science. We cannot set our ideals any higher than what we can conceive of; in fact man appears to be ever setting his ideals above his actions, never quite as good or as clever as he could wish; and when he improves he sets his ideals yet higher, and so never reaches them. This condition is named the development of consciousness. There comes a time in the progress of every man when he realizes that he is higher and apart from matter — and this is true even if men have not yet attained to that realization. We are not mere animals, but are imbued with a life principle and a higher force which is higher even than the human mind. The proof of this is that a few men and women have learned to control their minds, to concentrate on a fixed point until the active mind is absolutely stilled. Any person of good intelligence can do this with practice, if he have the will and the patience, for it takes a great deal of both. That which is highest in man — call it the soul, the Divine spark, the ego or what you will — is designed to govern both the mind and body. The majority of people have little government over their bodies, and a still smaller fraction have definite control over their minds. Yet all truly great men do rule both their appetites and their minds, for thus can they rise far above the crowd and accomplish the things for which we call them great. But the self-conscious individual is one who has come to recognize this divinity of the higher nature, this attribute of the God within, and who is striving to evolute to still higher paths of usefulness, that he may serve humanity. For it is a characteristic of those who have attained the greatest degree of self-consciousness that they discover nothing higher in the way of accomplishment than the service of mankind; and if they give time and effort to developing themselves it is that they may be the more fit to serve their fellows. The intellectual materialist who has not proceeded far on the way toward self-consciousness will probably challenge some of these statements because he has not experienced them, and what he has not felt he refuses to accept, as if it were possible for any one man to have all experiences or all knowledge. These sort of truths are taught by all grades of philosophers from ancient to modern times. But without depending upon authority, each of us can ask himself the question, "What is this within me that I call *I*? — that sits in judgment on my acts? — that impels me toward higher things, and condemns me when I yield to lower desires?" This it is that is here characterized as self-consciousness. The more I consult it, the more I listen to its voice, the more plainly it speaks, and it always teaches unselfishness and morality. When it is listened to, it informs a man of his faults, and thus assists him in curing them. To those who study their own consciousness it reveals other things — that they have faculties and powers, and that these appear supreme in their own domain. In other words, a man has will, which is his own, and choice, of which no one can deprive him. Will and choice send one man in search of the North Pole, another to the forefront of a battle, another to the bedside of the dying, another to the accumulation of wealth, another to a study of the stars, another to investigation of the laws of electricity, and so on *ad infinitum*. It is these qualities of finite godship which lead many to the conclusion that man is a spark of the Divine, and bound to evolute forever; that while he has freedom of will and choice for good or evil, he is never free from the hyperphysical superior will of good (or God) which always overcomes evil. Consult Steiner, 'The way of Initiation' (English trans., New York, 1910); Besant, 'A Study in Consciousness' (1900); Hudson, 'Evolution of the Soul'; Judge, 'Culture of Concentration' (1885).

CHARLES H. COCHRANE.

SELF-DEFENSE is the right to protect one's person or property from injury. The law further sanctions the mutual and reciprocal defense of those who stand in the near relation of husband or wife, parent or child. It is lawful to repel unlawful force by force, for the fundamental law in such cases is that one has a primary right to stop injury to oneself, to one's family, or those who rightfully look upon one as a protector. But it is an essential principle of law that we must not use more force than is necessary for self-defense. The law of self-defense is founded on necessity, and one in order to avail himself of this defense in law must show belief, and the reason to believe, that there was imminent danger to life, or of receiving bodily harm, and that as a reasonable person no other means of defense would be effectual; the danger must be apparent and imminent and either existing at the very time, or reasonably believed to be so. Threats alone do not justify or excuse homicide; there must be some actual demonstration of an intent to take life, or inflict bodily harm in order to establish self-defense to the extent of taking a life. In cases of mere assault it is generally held that the right of self-defense does not arise until reasonable effort has been made for protection. One who is in legal possession of property has the right to defend the same against one who manifestly intends or endeavors by violence to commit a felony, and may under certain exigencies in such defense kill his adversary. (See MANSLAUGHTER). An officer of the law authorized to make an arrest has the right to use necessary force, and if the person whom he is attempting to arrest, by resistance, brings violence upon himself, this cannot be made to justify the killing of an officer. In many of the States the principles of law respecting right of self-defense is the subject of statutes. (See ASSAULT; CRIMINAL LAW; MURDER; HOMICIDE). Self-defense in boxing is termed the "manly art." it being held that it is every man's

duty to know how to defend himself with his natural weapons in case of assault.

SELFRIDGE, sĕl'frĭj, **H(arry) Gordon,** Anglo-American merchant: b. Ripon, Wis., probably on Jan. 11, 1864; d. Putney, London, England, May 8, 1947. Educated in the public schools of Jackson, Mich., Selfridge joined Field, Leiter and Company (subsequently Marshall Field and Company) in 1879 and rose rapidly to a junior partnership, retiring in 1903 with a substantial fortune. After re-entering business briefly in Chicago, he went to England in 1906 and in 1909 opened a large department store, Selfridge and Company, in London, which by skillfully blending American advertising and merchandising methods with English needs and habits became an immediate success. Selfridge wrote *The Romance of Commerce* (1918) and essays published in *Callisthenes* (1933). *Florentine Merchants in the Age of the Medici* (1932), ed. by G. R. B. Richards, is based on his collection of Medici manuscripts. He became a British subject in 1937.

SELIGMAN, sĕl'ĭg-măn, **Joseph,** American financier: b. Baiersdorf, Bavaria, Nov. 22, 1819; d. New Orleans, La., April 25, 1880. Dissatisfied with the lack of opportunities for Jews in Germany, Seligman emigrated to the United States as a young man in 1837, and within a decade was followed by his seven brothers, all younger. After being employed for some time by Asa Packer, the Pennsylvania financier, Joseph went into business at Lancaster, Pa., with his brothers William and James, and with them later opened a dry goods store at Greensboro, Ala. In 1848 they moved to New York, N. Y., and this city became the headquarters of a family clothing and importing business which by 1857 had been joined by all seven brothers under Joseph's leadership.

The firm supplied a great volume of clothing to the army during the Civil War, and in 1862 it was transformed into a banking house, J. & W. Seligman & Company. Headquarters were in New York, but branches, each in charge of a brother, were soon opened at San Francisco, New Orleans, Frankfurt am Main, London, and Paris. The European branches, especially the one at Frankfurt, rendered valuable service during the Civil War by marketing hundreds of millions of dollars' worth of United States government bonds abroad. Joseph Seligman subsequently became a confidential financial adviser to President Grant, a personal friend of the family, and the firm played a leading role in handling the conversion operations of government bonds during the 1870's. Seligman was one of the Committee of Seventy that helped free New York City from the grasp of the Tweed Ring.

One of his brothers was Jesse Seligman: b. Baiersdorf, Bavaria, Aug. 11, 1827; d. Coronado, Calif., April 23, 1894. He reached the United States in 1841 and worked with his brothers in dry goods stores in the East. After the gold rush had begun, Jesse went to California with his brother Leopold in 1850 and opened a store in San Francisco. Here he amassed a considerable sum which he contributed to the family business upon his return to New York in 1857. Jesse succeeded Joseph in 1880 as head of J. & W. Seligman & Company, which under his leadership became active in floating securities for railroads in the South and Southwest.

Jesse Seligman was succeeded as head of the family firm in 1894 by a son of Joseph, Isaac Newton Seligman (b. Staten Island, N. Y., July 10, 1855; d. New York, N. Y., Sept. 30, 1917), under whom the company floated numerous loans for countries in Latin America and the Orient.

Another son of Joseph was the economist Edwin Robert Anderson Seligman: b. New York, N. Y., April 25, 1861; d. Lake Placid, N. Y., July 18, 1939. He studied at Columbia University (A.B. 1879, Ph.D. 1885) and taught there from 1885 until his retirement as professor emeritus in 1931. Seligman edited the *Political Science Quarterly* (from 1886) and was editor in chief of the monumental *Encyclopedia of the Social Sciences.* An expert on public finance, keenly interested in public affairs, he served on several tax commissions and was financial adviser to the Cuban government in 1931. Among his many books are *The Shifting and Incidence of Taxation* (1892), *Essays in Taxation* (1895), *The Economic Interpretation of History* (1902), and *Principles of Economics* (1905)—all of which went through numerous editions—and *Currency Inflation and Public Debts* (1921), *Studies in Public Finance* (1925), *The Economics of Farm Relief* (1929), and *Price Cutting and Price Maintenance* (1932).

SELIM I, sĕ-lēm', Turkish sultan: b. 1467; d. Sept. 20, 1520. He was a son of Bajazet II, whom he dethroned (1512) during a struggle in which he overcame his brothers Corcud and Ahmed. The Persian Shah Ismail I had been Ahmed's ally, and before proceeding against him, Selim, a Sunnite Muslim, is said to have slaughtered 40,000 of his Shi'ite subjects, who were the Persians' coreligionists and perhaps in sympathy with them. Ismail was completely defeated at Chaldiran in Armenia on Aug. 23, 1514, and Selim captured Tabriz.

The Mameluke sultan of Egypt, Qānṣawh al-Ghawri, whom Selim accused of being allied with Ismail, was overwhelmed by Selim's Turks, well equipped with muskets and artillery, at Marj Dābiq, north of Aleppo, on Aug. 24, 1516. Syria then fell into Turkish hands, and in January 1517 Selim captured Cairo, adding Egypt to the Ottoman domain. Selim transferred to Constantinople the puppet Abbasid caliph whom the Mamelukes had maintained at Cairo, and the caliphal privileges and finally the title were absorbed by Selim's successors. Even more important, the holy cities of Arabia acknowledged the Ottoman sultan as their protector. Selim was succeeded by his son Suleiman I.

SELIM II (called Selim the Sot), Turkish sultan: b. probably in 1524; d. Dec. 12, 1574. He was the son of Suleiman I, whom he succeeded in 1566. Engrossed in the pleasures of his court, Selim relied principally on two remarkable counselors: Mohammed Sökölli, grand vizier from 1560 to 1579, whose policy was pro-Venetian and anti-Spanish; and a Portuguese Jew, the financier Joseph Nasi (João Miguez, c. 1515–1579), who was anti-Venetian and anti-French. During Selim's reign the Turks captured Tunis from Spain in 1569 (lost to Spain in 1573, but recovered in 1574); took Cyprus from the Venetians in 1570–1571; but suffered

defeat in the naval battle of Lepanto (1571), which ended Nasi's influence. Selim was succeeded by his son Murad III.

SELIM III, Turkish sultan: b. 1761; d. Constantinople, July 28, 1808. He was the son of Mustafa III and succeeded his uncle Abdul-Hamid I in 1789 during the war with Russia and Austria. After this conflict ended in the Treaty of Jassy (1792), Selim began a determined effort to reform the Ottoman state, particularly the finances and armed forces. But although he raised a small corps armed and trained in the European fashion, little was accomplished because of resistance by the Janissaries and religious leaders and the inertia of a ponderous administrative system.

Egypt, occupied by the French under Napoleon in 1798, was returned to Turkey in 1802. Continued Russian expansion led to a *rapprochement* between Selim and Napoleon and to war with Russia in 1806. In 1807, however, the sultan was overthrown and imprisoned by a rising of the Janissaries, who replaced him with Mustafa IV. Selim was strangled upon the approach of loyal forces under Mustafa Bairakdar, who captured Constantinople and raised to power Selim's nephew and pupil Mahmud II.

SELINSGROVE, sē'lĭnz-grōv, borough, Pennsylvania, on the Susquehanna River in Snyder County, 36 miles north of Harrisburg. The borough manufactures hosiery, paper products, and tools. Susquehanna University, founded in 1858, is here. Selinsgrove was settled in 1755 and incorporated in 1827. Pop. (1950) 3,514.

SELINUS, sē-lī'nŭs (Ital. SELINUNTE), ancient Greek city, Sicily, on the southwest coast, now an isolated site about eight miles south-southeast of Castelvetrano. It was founded in the 7th century B.C. and flourished during the 5th century. Its traditional enemy, Segesta, after receiving ineffective aid from Athens, called in the Carthaginians, who sacked Selinus in 409 B.C. It never recovered, though it became a Carthaginian tributary and was quickly repopulated. In 250 B.C. the Carthaginians razed the city and moved the inhabitants to Lilybaeum (now Marsala). The remains include temples, walls, and an acropolis, none in a good state of preservation.

SELJUKS, sĕl-jōōks', originally Turkoman tribesmen, who in the 10th century fought their way into western Asia and established dynasties in Persia, Mesopotamia, Syria, and Asia Minor. Tradition derives the name from Saljūq, the chieftain of a Ghuz (Ghuzz) tribe which had settled in the Bukhara region and embraced Islam, of the Sunnite variety.

Great Seljuks.—The history of the Seljuks assumes major importance in 1055 when Tugrul (Tugril Beg), grandson of Saljūq, having pushed his conquests through Persia, entered the Abbasid capital, Baghdad, and was received by the caliph al-Qā'im (r. 1031–1075) as a deliverer from the domination of a Persian Shi'ite dynasty, the Buwayhids. Al-Qā'im bestowed on Tugrul the title of sultan ("he with authority").

Tugrul was succeeded by his nephew Alp Arslan (r. 1063–1072), who in 1071 inflicted a crushing defeat on the Byzantine army at Manzikert (Malazkirt), opening Asia Minor to an influx of Turkomans and Turks, in whose hands it has remained.

Alp's son and successor, Malik Shah (r. 1072–1092), who was ably served by his illustrious Persian vizier, Nizam-al-Mulk, ruled a sultanate extending from Afghanistan to the Byzantine borders and is considered the greatest of his line. During his reign the frontiers were extended by various chieftains to Syria, Palestine, and western Asia Minor; new roads were opened, mosques built, canals dug, and large sums expended on caravanserais. After Malik Shah's death, civil wars among his sons and other disturbances led to the breakup of his house, although the main line, the Great Seljuks, maintained a nominal suzerainty in Persia down to 1157.

Syrian Seljuks.—The founder of Seljuk power in Syria was Tutush, son of Alp Arslan, who gained possession of Aleppo in 1094. His sons ruled at Aleppo and Damascus. Various Seljuk dynasts ruled in North Syria from 1078 to 1171.

Rum Seljuks.—More important than the Seljuks of Syria were the Rum (that is, Roman or Western) Seljuks who ruled in Asia Minor from 1077 to about 1300, becoming independent with the decline of Great Seljuk power. This branch was founded by Suleiman ibn-Qutulmish, a cousin of Alp Arslan, who was put in charge of the conquered territory and established himself at Nicaea (now İznik), not far from Constantinople, in 1077. The Rum Seljuk capital was moved to Iconium (Konya) in 1084.

Hemmed in between the Byzantines on the northwest and the states the Crusaders established at Antioch (Antakya) and Edessa (Urfa) on the southeast, the Rum sultanate was limited to central Asia Minor. Nevertheless, trade flourished with the Italian merchant republics and the kingdom of Little Armenia in Cicilia, and sultans and princes vied in building mosques, madrasahs (mosque schools), and other public buildings which still attract students and visitors. Gradually, however, Asia Minor became partitioned into rival petty principalities, which were overcome by the Mongol onslaught in the mid-13th century. One of these principalities was that of the Ottoman Turks, cousins of the Seljuks and, beginning with the 14th century, their heirs.

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SELKIRK, sĕl'kûrk, or **SELCRAIG,** sĕl'krāg, **Alexander,** Scottish sailor, the original of Daniel Defoe's Robinson Crusoe: b. 1676; d. Dec. 12, 1721. The son of a shoemaker of Largo, Fifeshire, he was an experienced seaman when, in May 1703, he joined William Dampier's privateering expedition to the South Seas as sailing master on the *Cinque Ports.* After quarreling with his captain, Thomas Stradling, Selkirk was marooned at his own request on uninhabited Más a Tierra Island of the Juan Fernández group in October 1704, remaining there until he was taken off by the *Duke* of Woodes Rogers' expedition in February 1709. He died a master's mate on H.M.S. *Weymouth.* Selkirk's stay of more than four years on Más a Tierra was described by Richard Steele in the

Englishman (No. 26; Dec. 3, 1713), in Rogers' *Voyage Round the World* (1712), and in Cook's *Voyage to the South Sea and Round the World* (1712); but there is no reason to believe that he had any papers or journal of any sort. He is known as the prototype of the *Robinson Crusoe* (1719) of Daniel Defoe (q.v.), who apparently derived such information as he had from Steele, Woodes Rogers and Edward Cooke. Little of the details of the famous narrative, however, is derived from Selkirk's adventure.

SELKIRK, 5TH EARL OF (THOMAS DOUGLAS): b. Kirkcudbrightshire, Scotland, June 20, 1771; d. Pau, France, April 8, 1820. He was educated at Edinburgh University, and in 1799 succeeded his father in the earldom. He was active in the promotion of the emigration movement to the Red River and the colony established there was known as the Earl of Selkirk's Settlement. He published *Sketch of the British Fur Trade in North America* (1816); *The Red River Settlement* (1817).

SELKIRK, town, Province of Manitoba, Canada, on the Red River of the North, 23 miles north-northeast of Winnipeg, and on the Canadian Pacific Railway. The town is a popular summer resort. Its fisheries are of considerable importance. There are large cold storage plants, government shipyards and dry docks; mental hospital. Pop. (1951) 6,218.

SELKIRK MOUNTAINS, or **SELKIRKS,** range of the Rocky Mountains, in British Columbia, from about latitude 52° to 48° N. The Columbia River is on the eastern side for some distance, and the Canadian Pacific Railways crosses the range between the peaks Sir Donald (highest peak, 11,123 feet), and Glacier House at an altitude of 4,300 feet.

SELLERS, sĕl'ĕrz, **Coleman,** American engineer: b. Philadelphia, Pa., Jan. 28, 1827; d. there, Dec. 28, 1907. He obtained a degree at Stevens Institute of Technology, and was professor of engineering practice there from 1886. He was chief engineer of the Niagara Falls Power Company, and chief mechanical engineer of the Canadian Niagara Power Company. He made numerous inventions in mechanical appliances, was a member of many American and foreign scientific societies, and was widely known as a consulting engineer.

SELLERS, David Foote, United States naval officer: b. Austin, Texas, Feb. 4, 1874; d. Bethesda, Md., Jan. 27, 1949. Appointed to the Naval Academy from New Mexico in 1890, he was graduated with distinction in 1894 and advanced through the grades to rear admiral in 1927. He held the rank of admiral, retired, after July 16, 1942. Some of his more important posts include: flag lieutenant and aide to commander in chief of the Atlantic Fleet (1905–1907); executive officer, U.S.S. *Arkansas* (1914); commanding officer, U.S.S. *Salem,* and later U.S.S. *Birmingham* (1915); aide to secretary of the navy (1921–1922); commanding officer, U.S.S. *Maryland* (1922–1923); commanding officer of naval training station at San Diego, Calif. (1923–1926); chief of staff of the commander of the Scouting Fleet (1926–1927); commanded special service squadron of five cruisers off Nicaragua (1927–1929); judge advocate general of the navy (1929–1930); commander of Battleship Division I of Battle Fleet (1931); commander of battleships, Battle Fleet (1932); commander in chief of the United States Fleet (1933–1934); superintendent of the U.S. Naval Academy (1934–1938).

SELLERS, Matthew Bacon, American aeronautical engineer: b. Baltimore, Md., March 29, 1869; d. Ardsley-on-Hudson, N. Y., April 5, 1932. He was educated in France and Germany, took his LL.B. at Harvard University in 1902, and later studied at the Lawrence Scientific School, Harvard, and at the Drexel Institute, Philadelphia He was engaged in aerodynamic research after 1900; was appointed a member of the Aerodynamic Laboratory Committee by President Taft in 1912; and in 1915 became a member of the Navy Consulting Board. He was the first to determine the lift and drift of arched surfaces by means of the wind tunnel; and inventor of the lightest aeroplane in the world. From 1911 to 1932 he was technical editor of *Aeronautics.*

SELLERS, William, American mechanical engineer and manufacturer: b. Upper Darby, Pa., Sept. 19, 1824; d. Jan. 24, 1905. He was apprenticed to a machinist, and in 1848 became a member of the firm Bancroft and Sellers, which in 1855 became William Sellers and Company, manufacturers of tools. He made many improvements in tools and invented many new appliances. He suggested the first formula ever offered for screw threads and nuts, which has since become standard in the United States and Europe. He was president of Franklin Institute in 1864–1867. He became president of the Edge Moor Iron Company in 1868, and in 1873–1887 directed the Midvale Steel Company, Nicetown, Pa., manufacturing materials for small arms and ordnance for the government. He was elected to the National Academy of Sciences in 1873.

SELLERS, Colonel Mulberry, the name of a character in the novel, *The Gilded Age* (1873), by Mark Twain and Charles Dudley Warner. He was a visionary Southern speculator, and was created on the stage by John T. Raymond.

SELLSTEDT, sĕl'stĕt, **Lars Gustaf,** American painter: b. Sundsvall, Sweden, April 30, 1819; d. Buffalo, June 4, 1911. He came to the United States in 1834, and subsequently served in the United States Navy. After settling in Buffalo, 1842, he devoted himself to a study of art, and in 1875 was elected a National Academician. He was one of the founders of the Buffalo Fine Arts Academy and was one of its directors for 26 years. His autobiography, *From Forecastle to Academy,* was published in 1905.

SELMA, sĕl'mà, city, Alabama, Dallas County seat, altitude 126 feet; on the north bank of the Alabama River, with year-round navigation; on the Southern; Louisville and Nashville; and Western of Alabama railroads; by rail, 10 miles south of Birmingham, 162 miles northeast of Mobile; also served by a municipal airport, and federal and state highways. River steamers and barges provide a means of transportation for shipments to and from Selma, complementing the railroads and truck service on the highways.

Situated in what is known as "the black soil belt," Selma is surrounded by a rich agricultural

region, producing cotton, livestock, and forage crops. Cotton, lumber, and food crops are the principal bases of the city's industry. Products of Selma plants are lawn mowers, candy, canning, cigars, creameries, meat packing, and fertilizers.

Besides public and parochial schools, the city has several business colleges and Selma Univercity, a Baptist school for Negroes. It has a Carnegie library, more than 40 churches, three hospitals, and a children's home. The Craig Air Force Base, established in 1940, and located 4½ miles southeast of Selma, later became part of the United States Air University, but is now under the Training Command. In the Civil War, Selma was the site of a Confederate navy yard. Pop. (1940) 19,834; (1950) 22,629.

SELMA (Ala.), **Battle of,** an engagement of the Civil War, April 2, 1865, one of the battles of General Wilson's cavalry raid in the operations against Mobile. The Union cavalry camped at a point 19 miles north of Selma on April 1 and on the morning of the next day began the movement against the town. One division advanced from the north on the Sumnerville road, and a second division from the northeast on the Burnsville road, while a third division was dispatched to burn railroad bridges, trestles, stations, etc., as far as Burnsville. The troops were in position before Selma by 4 P.M. and, dismounting, assaulted and carried the works at a single charge, the distance over which they charged, exposed to the enemy's fire, being 600 yards. The Selma fortifications consisted of a bastion-line with a radius of three miles; the Confederate force on the line against which the charge was made was over 1,500; the Union force engaged numbered 1,550. The Federals captured 31 field guns, a large number of prisoners, and quantities of stores of all kinds.

Consult Johnson, R. V., and Buel, C. C., *Battles and Leaders of the Civil War,* 4 vols. (New York 1884–1888).

SELOUS, sĕ-lōōs′, **Frederick Courteney,** famous big game hunter and explorer: b. London, Dec. 31, 1851; killed in action, East Africa, Jan. 4, 1917. Of mixed French, English and Scottish parentage, he was educated at Rugby, Neuchâtel and Wiesbaden, and at 19 set out for Africa to become an elephant hunter. After spending a time on the Kimberley diamond fields he entered the wild Matabele territory (now Southern Rhodesia) and obtained permission from the savage chieftain Lobengula to carry out his object. By the time he was 25 Selous was known as the most daring and successful ivory hunter in Africa. Nor did he restrict his activities to elephants alone; lions, hippo and rhinoceroses fell to his unerring rifle. In 1889 he traveled down the Zambesi to the sea and in 1890 led the pioneer expedition of the Chartered Company into Mashonaland and secured that territory for Britain. He fought in both the Matabele wars, and in later life resumed his hunting adventures. In 1909–1910 he organized and accompanied Colonel Roosevelt's hunting expedition in British East Africa. Though over 60 years of age he offered his services for the war; was gazetted lieutenant in the Royal Fusiliers in 1915, and captain a few months later. In September 1916 he received the D. S. O. "for conspicuous gallantry, resource and endurance."

Selous wrote *A Hunter's Wanderings in Africa* (1881), a book regarded as a classic on hunting; *Travel and Adventure in Southeast Africa* (1893); *Sunshine and Storm in Rhodesia* (1896); and *Recent Hunting Trips in British North America* (1907).

SELUNGS, sĕ-lŭngs′, a race of men, now few in number, and of doubtful affinities, but usually classified as Indonesian, inhabiting the Mergui Archipelago and other islands along the eastern coast of the Bay of Bengal. They live almost wholly in boats made of palm-leaf ribs sewed together by threads of coir and subsist almost exclusively on seafood, to which fact is attributed the prevalence of leprosy among them. Their principal industry is the gathering of edible birds' nests from the towering cliffs of granite by means of immensely long bamboo ladders. They also gather some mother-of-pearl and other salable shells with which they occasionally come to the ports on the mainland to trade for cloth, etc. They are despised by both the Burmese and Malays, with whom they most often come into contact.

SELVAGE, sĕl′vĭj, the edge of a woven fabric. *In mining,* selvage is a layer of clay or decomposed rock along the wall of a vein.

SELWYN, sĕl′wĭn, **Alfred Richard Cecil,** Canadian geologist: b. Kilmington, Somerset, England, July 28, 1824; d. Vancouver, British Columbia, Canada, Oct. 18, 1902. In 1845 he was appointed assistant on the Geological Survey of Great Britain, and in 1852 director of the Geological Survey of Victoria, Australia, which was not completed until 1869, when he was appointed director of the Canadian Geological Survey, completed in 1895. He also investigated the coal and gold fields of Tasmania in southern Australia in 1854–1859. He was a fellow of the Royal Society, was made an honorary LL.D. by McGill University, and was created C.M.G.

SELWYN, sĕl′wĭn, **George Augustus,** English wit and politician: b. Gloucestershire, Eng., Aug. 11, 1719; d. London, Jan. 25, 1791. He was educated at Eton and Oxford, but quitted Oxford before graduating on account of a reputed insult to the Christian religion. He was appointed to several offices at the mint involving no work and bringing him a small salary. In 1747 he entered Parliament for Ludgershall and from 1754 to 1780 sat for the city of Gloucester. He never spoke at Parliament, but his vote being always cast with the court party secured him lucrative appointments. He was a famous wit at the clubs and an intimate of the duke of Queensberry, Horace Walpole and Lord Carlisle.

SELWYN, George Augustus, English bishop: b. Church Row, Hampstead, Eng., April 5, 1809; d. Lichfield, April 11, 1878. He was educated at Eton and at Cambridge; rowed in the first interuniversity boat race (1829). His remarkable powers as an athlete were found very serviceable in after life. In 1841 he was consecrated bishop of New Zealand and Melanesia, a territory since then divided into seven dioceses. On the voyage out he studied Maori and navigation and in his own vessel visited every portion of his diocese before setting about the work of organizing it. A visit to England in 1854 brought back John Coleridge Patteson, afterward bishop of Melanesia, where he was murdered by the na-

tives. In 1868, while in Britain attending the first Pan-Anglican Synod, at Lambeth, he accepted the vacant bishopric of Lichfield. Through public subscription, Selwyn College (q.v.) was established at Cambridge University in 1882 as a memorial to him.

SELWYN COLLEGE, Cambridge, England, was founded in 1882 in memory of George Augustus Selwyn (q.v.), bishop of Lichfield. It is an institution meeting the requirements of Anglican theological students, on a more economical basis than those of the older established colleges, "combined with Christian training according to the principles of the Church of England."

SEMANTICS, (1) the science of word meaning and (2) a system of speech analysis intended to promote more exact expression and assure better understanding. The word comes from Greek *semantikos,* signification, and in modern usage replaces the earlier word *semasiology.* The modern semantician studies the history and present status of words; analyzes their value and force; and combats the tendency to ambiguity inherent in the nature of language and the mind. He stresses the fact that words do not have a single fixed, unalterable meaning, and classifies them by the purpose and manner of their use. He studies figures of speech, multiple meanings, the importance of context, the art of defining, and the nature of words. In connection with semantics, a system called Basic English has been promoted; it rests upon the theory that English can best be taught, learned, and improved by use of a selected vocabulary of essential (basic) words. See Basic English; Language, Science of—*Semantics.*

SEMAPHORE, a signaling device; originally a set of arms pivoted upon a post, used by the French for transmitting messages over long distances. Mounted on towers at intervals of 5 to 10 miles, read by telescope and passed on from station to station, they provided a means of communication previously unmatched in speed. In 1816 the British Admiralty adopted a similar system with apparatus embodying some improvements suggested by Sir Home Riggs Popham; two arms were used instead of six, and they were pivoted in such a manner as to give 48 separate letter and digit signals, and capable of sending in any direction instead of on one fixed line. Dispensing with pivoted arms on a post, in military and naval usage men also semaphore with their arms, generally holding small flags to make the signals clearer. The semaphore post is used in railway signaling, and in some highway traffic systems. See Block and Other Railway Signal Systems.

SEMARANG, sĕm-ä-räng′, Netherlands Indies, a seaport town on the north coast of Java, at the mouth of a river of the same name, 255 miles east of Batavia. The river is silted up at its mouth, but a canal, constructed in 1879, serves as a harbor. Although high seas during the monsoon season render the port unusable for several weeks each year, Semarang is the most important trade center of central Java. Ten per cent of all the imports and five per cent of all exports of the Netherlands Indies pass through the port. It has had rail connection with other towns on the island since 1873; and it is also connected with Batavia and Soerabaja by air transport services. Pop. 223,000 (13,000 whites; 210,000 Indonesians).

SEMBRICH, zĕm′brĭk, **Marcella** (real name Praxede Marcelline Kochanska, kô-kän′y-skä), operatic soprano: b. Lemberg, Austria (later Lwów, Poland), Feb. 15, 1858; d. New York City, Jan. 11, 1935. The daughter of Kasimir Kochanski, a Polish musician, she adopted for her stage name the maiden name of her mother. She studied piano at the Lemberg Conservatory under Wilhelm Stengel, whom she married in 1877. After making her debut at Athens, Greece, in 1877 as Elvira in *I Puritani,* she studied for a while under Richard Lewy, and in October 1878 made a highly successful appearance at Dresden, Germany in the title role of *Lucia di Lammermoor.* In June 1880 she made her first appearance at Covent Garden, London, again singing the part of Lucia; subsequently she sang other roles in London, and returned to that city for the seasons 1881–1884. In 1883 she sang at the Metropolitan Opera House, New York City, and she was leading soprano there from 1898 until her retirement from opera in 1909. She often appeared on the concert stage, and continued her concert work in the United States until 1917. Subsequently she was a successful voice teacher, from 1924 heading the vocal department at the Curtis Institute, Philadelphia, Pa. Her voice, adapted to every type of lyric and coloratura music, had a range from the C below the treble clef to F above it.

SEMECARPUS, a genus of trees of the Anacardiaceae, containing about 35 species. The marking-nut tree (*S. anacardium*) is the most important species. The pericarp of its fruit furnishes a juice greatly used in India for printing cotton cloth, for ink, and for dye. It is also employed for warding off white ants and for a medicine in rheumatism, warts, and leprosy. When pounded and boiled in rape-seed-oil it stays putrefaction when started in hides. The seed itself, which is called Oriental cashew-nut or melacca bean, and the fleshy pedicel, are eaten by the natives. The resin of this species yields Sylhet varnish, and an oil derived from it, mixed with the milk of euphorbia, is made into birdlime. This species is cultivated to a limited extent in southern Florida.

SEMELE, sĕm′ŭ-lê, in Greek mythology, daughter of Cadmus, king of Thebes, beloved by Zeus. Hera, prompted by jealousy, persuaded her to ask of Zeus that he should appear before her in all his glory. Zeus unwillingly consented, and in the lightning, which was the symbol of his majesty, Semele was consumed, after giving birth to a son by Zeus, the god Bacchus or Dionysus. The latter found his mother in Hades and took her to Olympus.

SEMIAUTOMATIC GUNS. See Ordnance.

SEMINOE DAM. See Dams.

SEMINOLE (sĕm′ĭ-nōl) **INDIANS** (Creek Simanoli, "separatist," "renegade"). An important tribe of the Muskhogean stock of American Indians. The name was originally applied

to those Creeks and Hitchitis on lower Chattahoochee River who left the main body about 1762–1768 and removed to the peninsula of Florida. Previously the territory had been occupied by the Appalachis who were practically exterminated some 60 years before, although some Creeks, who later became part of the "Seminoles," have resided in the southern part of Florida since the middle of the 16th century. The separation of the Creeks and Hitchitis from their northern kinsmen was due chiefly to over-population of the older towns. The Hitchiti elements consisted principally of the Mikasukis; there were also probably some Yamasis, and certainly some Yuchis and Negroes. The Seminoles are known to history chiefly through their two wars with the United States (see SEMINOLE WAR). On the final surrender the Seminoles (with the exception of some who fled to the swamps), to the number of 3,824, were moved to the West, where they constituted one of the Five Civilized Nations resident in reservations in the Indian Territory; the others were the Cherokees, Choctaws, Chickasaws, and Creeks. The total area of their reservation comprised 365,852 acres, of which 1,932 acres were reserved for town sites, railroad rights of way, and other purposes.

SEMINOLE WAR, the second of the two wars in which the Seminole Indians of Florida engaged against the United States, the first having been a short conflict in 1817–1818, which was ended by Gen. Andrew Jackson (q.v.), who destroyed villages of the Indians and wholly subdued them. The second, which is that usually referred to as the Seminole War, began in 1835 and ended in 1842, and was the fiercest of all wars waged by the United States against Indians. It began in consequence of the refusal of a part of the tribe to make a cession of its lands in Florida and submit to removal to the Indian Territory, in accordance with the terms of a treaty ratified in 1834. On the Indian side the war was at first conducted by the celebrated chief Osceola (q.v.), with whose name it is largely associated; and on the part of the United States it was carried on by Winfield Scott, Zachary Taylor (qq.v.) and other commanders. See SEMINOLE INDIANS.

SEMIPALATINSK, sĕ′mē-pä-lä-tēnsk, Soviet Union, capital of a Region of the same name, Kazak Soviet Socialist Republic, situated on the left bank of the Irtish River in lat. 50° 28′ N., 80° 13′ E. The Region contains rich deposits of gold, copper, lead, and other minerals. The inhabitants, comprising Tatars, Kazaks, and Russians, engage in stock-raising on a considerable scale, and cultivate wheat and other crops. The city of Semipalatinsk is an important commercial center; it is on the route of the railroad between Stalinsk and Alma Ata, and much of its trade is also carried by steamers on the Irtish. Industries include meat packing and the manufacture of leather goods. Pop. (1939) 109,779.

SEMIPALMATED SANDPIPER. See SANDPIPERS.

SEMIRAMIS, sĕ-mĭr′ą-mĭs, a mythical queen of Assyria. According to legend she was a daughter of the fish-goddess Derceto of Ascalon, in Syria, by a Syrian youth. Being exposed by her mother, she was miraculously fed by doves until discovered by the royal shepherds, the chief of whom, Simmas, took her to his own house and brought her up. Her surpassing beauty, according to Ctesias, having attracted the notice of Onnes, the governor of Nineveh, he married her. She subsequently accompanied her husband to the seige of Bactra, where by her advice she assisted the king's operations. Captivated by her abilities as well as by her beauty, Ninus, the founder of Nineveh, asked her of her husband, who refused to yield her, and when Ninus added threats to entreaties hanged himself. As queen of Assyria, Semiramis built Babylon, adding fine buildings and hanging gardens. She led campaigns against Persia, Egypt, Libya, and Ethiopia. Finally with a host of 3,000,000 foot, 500,000 horse and 100,000 war-chariots she engaged in battle with King Stabrobates and was defeated in a battle on the Indus with the loss of one-third of her forces. Upon this, it is said, she vanished in the shape of a dove, or slew herself. Evidently she has no existence in history. She is the goddess of war and of love, the Istar of the Assyrians, to whom the dove was sacred.

SEMIRARA, sä-mē-rä′rä, **ISLANDS,** Republic of the Philippines, a group lying south of Mindoro and the Tablas Strait, between that island and Panay. The group consists of eight islands and a number of small islets, the aggregate area being 60 square miles; the largest island, 35 square miles in area, contains coal of good quality. The people are Visayans, and are mostly engaged in turtle and trepang fishing. Pop. about 600.

SEMITE, a name given to a group of nations allied in language, religion, manners, and physical features, represented in Genesis 10 as descended chiefly from Shem, a son of Noah. The name was used by Johann Gottfried Eichhorn (q.v.), in 1787, in his *Introduction to the Old Testament* (2d ed., i. 15). The habitat of the Semites is Ethiopia, Arabia, Palestine, Phoenicia, Syria, and the countries of the Euphrates and Tigris. Into those lands, according to one theory which is supported by François Lenormant (q.v.) and others, there had preceded them an immigration of Cushites of the Hamitic race, who, proceeding from central Asia, occupied not only the lands that afterward became Semitic, but also the Nile Valley. Their Hamitic language and civilization the Semites are said to have adopted. In language the Semites do show some affinity with the Berbers and the inhabitants of the Nile Valley, and Genesis 10 does, for political and geographical, or other reasons, distribute the sons of Ham and Shem in a peculiar manner. But the increasingly prevalent theory is that not less than 4,000 years B.C. the Semites migrated as nomadic tribes, probably from Arabia into Mesopotamia. There they found a Turanian population dwelling in cities built of brick, under the regular government of priest kings, skilled in the use of metals, using the cuneiform mode of writing, and comparatively far advanced in literature and culture. The hold of the Semites on Shumir, the lower, more fertile, and more thickly inhabited part of the Euphrates Valley, was not at first so strong as on Accad, the upper part. In 3800 B.C. the Semitic adventurer Sharrukin usurped the kingdom of Accad. In Elam also the Turan-

ian population was early overpowered by the intruding Semites, who came to form the upper strata of society. In 2280 B.C. the Semite Khudur-Nankhundi of Elam invaded and conquered Shumar and Accad, founding the Elamite line of princes; and about 2200 B.C. one of his successors, Khudur-Lagamar (Chederlaomer), carried his conquests as far as Palestine (Gen. xiv).

These painful and oppressive impulses, and probably others like them, seem to have occasioned emigrations of many Semites. Some proceeded toward the northwest, reached the Mediterranean Sea, founded Sidon, Tyre and other cities and became known afterward as Canaanites or Phœnicians. Later, from Ur went others in the same direction, settled behind the Phœnicians and were afterward known as Israel. Others went north and built cities which developed into the empire of Assyria. While the Semites were in Mesopotamia they used the Turanian language in their public documents till they attained the ascendant in political power; and when afterward they used their own language they continued to use the Turanian cuneiform mode of writing. The Turanian religion also was adopted by the Semites, and mixed with what religion their own primæval tribal religion or totemism had developed into. This amalgamation was consummated by Sharrukin II of Accad about 2000 B.C.

The Semites as a race have a fine physical organization, are mentally quick, clever but not inclined to change, and not persistent in progress. They have been distinguished by a brilliant imagination and love of the beautiful; but have not shone in philosophy or in science. Their literature has neither epic nor dramatic poetry worth notice. Almost their only arts are the sculpture of Assyria, the exquisite glass and pottery and the textile fabrics and embroidery of the Phœnicians. Impatient of restraint, the Semites have not by political aptitude welded together themselves or others into large, compact and enduring commonwealths. They have made their mark on the world in the Phœnician commerce, which visited even the Atlantic shores of Spain and France and drew tin from Britain; in the Phœnician colonies, which, dotting all the coasts and many islands of the Mediterranean Sea as far as Cadiz, and the coast of Asia as far as India, dispensed manufacture, developed primitive navigation (even to the extent of circumnavigating Africa more than 2,000 years before Vasco da Gama), stimulated industry, trade and ingenuity, and radiated the light of material civilization; in the Carthaginian Empire within Europe and Africa; in the exploits of Hannibal; in the dissemination of alphabetic writing, whereof the Phœnician form was the mother of the European and of most Asiatic alphabets, while the alphabet of the great Sabæan kingdom, or of the great and still more ancient Minæan kingdom in Arabia, is apparently the eldest of all alphabets hitherto discovered; in the Babylonian and Assyrian empires; in the Hebrew Bible and the Jewish religion; in the New Testament and the Christian religion; in the Koran and the Mohammedan religion; in the Mohammedan conquests and empire, and in the preservation of culture thereby during the Dark Ages and the Middle Ages. The difficulty of generalizing with exactitude as to the origin and character of the Semites is increased, as Nöldeke has shown, by the fact that we assume that the most important traits of some Semitic peoples are common to all. In reality some striking features which are ascribed to racial influence are due to external conditions of life, which under similar circumstances are also developed among non-Semitic races. Linguistically, too, it is a no less formidable task to understand aright the kinship of the Semites. They are usually divided into two groups — Northern and Southern. The latter include Arabs, Yemenites, Abyssinians; the rest compose the Northern, whose classification is less happy, as their relationship to each other is less close. As to Semitic origins, it is usually held that Arabia was the Semitic cradle-land, with North Africa that of the Hamito-Semitic race. It is now doubted that they originated in certain districts in Armenia, while the ingenious theory of an eminent Italian Orientalist, Guidi, that the lower Euphrates was their home meets equal disfavor. Consult Brinton, 'Races and Peoples' (New York 1890); Ripley, 'Races of Europe' (1901); Barton, 'Sketch of Semitic Origins' (New York 1902).

SEMITIC LANGUAGES, the languages spoken by the nations of whom Shem was considered the common ancestor. The word Semitic comes from the Septuagint form of the name Shem, Shemitic, derived directly from the Hebrew, being much less frequent. The Semitic languages form a group somewhat like the Aryan group, although the relationship of the different languages is much closer. The members of the group do not entirely correspond to the list of the descendants of Shem given in Gen. x, 21–31; Elam, for example, which is included, in x, 22, was not a Semitic people, while the Canaanites, including the Sidonians, who were Semitic, are given in x, 15 among the descendants of Ham. Such facts indicate that the table of nations in Gen. x was not entirely ethnological, but at least partly geographical: the nations were grouped according to their geographical distribution in the time of the writer.

General Divisions.— The Semitic languages are often divided into two main divisions, Northern and Southern. But the former can be divided into three groups, Eastern, Northern and Middle, which are separated from each other by differences very nearly as great as those between the two divisions first mentioned. It seems better, therefore, to recognize the general division as fourfold, into Eastern, Northern, Middle and Southern Semitic languages.

The Eastern Branch.— The Eastern branch includes the Babylonian and Assyrian languages. Assyrian is really a dialect of Babylonian, there being but very slight phonetic differences between the two, although the difference is somewhat greater in the form of the characters. Babylonian is found much earlier than Assyrian and also continues somewhat later. The Babylonian inscriptions thus far found begin probably about 4000 B.C., possibly somewhat earlier, and extend to the capture of Babylon in 538 B.C. Babylonian was also used later as a literary language under the Persian and Greek rulers of Babylonia. Assyrian inscriptions ex-

tend from about 1800 B.C to shortly before the fall of Nineveh in 606 B.C.

The Northern Branch.— The Northern Semitic or Aramaic branch includes many languages and dialects, to all of which the general term Aramaic is applied. The oldest Aramaic literature is found in the inscription of Zakkūr, 9th to 8th century B.C., and in the inscriptions from Senjirli, of the 8th century B.C., some words on Assyrian and Babylonian tablets being only a little later. The language of these inscriptions differs very much from the later Aramaic languages and resembles the Canaanite language in many particulars. The Aramaic languages are divided into two principal branches, Western and Eastern, the geographical distribution of which was largely in harmony with these names. Western Aramaic may be called one language, with the following principal dialects: Biblical Aramaic, being the language of portions of the Old Testament books of Daniel and Ezra, and of a few words elsewhere in the Old Testament; Targumic Aramaic, usually so-called, the language of the Palestinian Targums; the similar language of most of the Gemara of the Palestinian Talmud and of the Palestinian Midrashim, which is also found in small parts of the Mishna, and also of the Babylonian Gemara; Samaritan, the language of the Samaritan Targum to the Pentateuch; the language of some Jewish inscriptions and papyri from Egypt, dating somewhat before the time of Christ; the language of the few Aramaic words found in the New Testament; the language of the inscriptions found in Tadmor or Palmyra; and the language of the Nabatean inscriptions found in Idumea and vicinity. The only modern representative of Western Aramaic is the language spoken at the present time by a few people near Damascus, in and near the village of Malula, which is written in the Syriac character but belongs in this class. Eastern Aramaic includes Syriac, Mandaic, being the language of the Christian sect of Mandæans who lived east of the Tigris, and the language of the most of the Babylonian Gemara. Syriac was the language of the Christian Arameans and was employed in an extensive literature, chiefly of an ecclesiastical nature, extending from the 2d to the 13th century A.D., including the translation of the Bible known as the Peshitta. The word Syriac means the same as Aramaic and was adopted by the Arameans from the Greeks, because the word Aramaic had come to be used as meaning heathen. After the separation of the two sects known as the Nestorians and Jacobites, each developed its own dialect, known as the Nestorian and the Jacobite, respectively. The actual dialectical differences are but slight, chiefly in the pronunciation of the vowels. In writing, somewhat different forms of the characters were used and the vowels were represented by entirely distinct systems, in the Nestorian dialect by dots, in the Jacobite by characters borrowed from the Greek. The modern representative of the Nestorian branch is the language used by the Nestorian Christians, in parts of Persia, especially in the city of Urmia and vicinity, in some villages in Kurdistan and in portions of Mesopotamia. This language shows very many changes from ancient Syriac, those in the verb being especially striking, while the vocabulary has received very many foreign words, especially from Arabic, Persian and Kurdish. Further, this language shows forms not found in Syriac, but preserved in other Aramaic languages as well as in some of the other Semitic languages, so that it is evidently descended not from ancient Syriac itself, but from a closely related dialect. There are four principal dialects of modern Syriac, that used in Urmia and vicinity, that of northern Persia and some adjacent regions in Turkey, that of Kurdistan and that of Mosul and vicinity. While the language is the same in all these, yet there are very many dialectical variations. The modern representative of the Jacobite Syriac is the language of Tur Abdin, in western Kurdistan, which is similar to the modern Nestorian language, but with many differences.

The chief general feature that distinguishes the Eastern and Western Aramaic languages is the preformative of the imperfect. This is *y* in all the Western Aramaic dialects, although a few forms with *l* are found in Biblical Aramaic, and *n* in all the Eastern, although Mandaic and the Babylonian Talmud have *l* along with *n*. In modern Syriac the verbal form is so much different that no preformative is used.

The Middle Branch.— The middle Semitic branch is also called Canaanite, for all its languages are often included under the general term Canaanite. The only one of these languages in which much literature has survived is the Hebrew. Nearly all of the Old Testament is in ancient Hebrew. Aside from this, the oldest Hebrew documents are probably about 75 inscribed potsherds found at Samaria in 1910, written in ink by a reed pen, containing brief business memoranda. These are usually ascribed to the time of Ahab, the first half of the 9th century B.C. A small limestone calendar tablet was found at Gezer in 1908 and is assigned to the 8th century. The Siloam inscription is usually dated at about 700, but is possibly much later. Various inscribed Hebrew seals have been found, dating perhaps from the 8th century on. Coins with Hebrew characters are from the 2d century B.C. to the 2d century A.D. New Hebrew or Mishnaic Hebrew is found chiefly in the Mishna, and also somewhat in the Gemara and in related works. Hebrew has continued to be used somewhat by the Jews as a literary language even to the present time, most of the later literature being produced in the Middle Ages. The language as thus used is ordinarily similar to Mishnaic Hebrew. The Phœnician has much that is identical with the Hebrew, while the differences are slight, affecting the vowels more than the consonants, although the vocabulary shows some variations. It is found in inscriptions from Phœnicia and her colonies, prominent among the latter being Carthage, where the language was called Punic. Considerable portions are also found quoted in works of Latin and Greek authors, chiefly in the Pœnulus of Plautus. Most of the Phœnician inscriptions are from the 4th century B.C. and later, some are as old as the 6th century, while the oldest inscription may belong to the 8th century or a little earlier. The inscription of Eshmunazar, from the time of Alexander the Great, is the most important. In this group are also included the Canaanite, Moabite, Ammonite and Edomite languages. The last two are known only from the proper names found in the Old Testament and the inscriptions of other nations,

the Moabite from that source and also from the Moabite stone, written by Mesha, king of Moab, and dating from about 850 B.C. The Canaanite, aside from information given in the Old Testament, is known from glosses found in the Tell el-Amarna tablets (see AMARNA LETTERS) about 1400 B.C. All four are substantially identical with Hebrew, the Canaanite and Moabite, which of course are known more fully than the other two, showing slight dialectical variations. Moabite and Phœnician, like Hebrew, have *waw* consecutive with the imperfect. Some of the Philistine proper names given in the Old Testament are Semitic. It is generally agreed, however, that the nation was not Semitic, but perhaps learned and used the common Canaanite language after their arrival in Palestine.

The Southern Branch.— The Southern Semitic branch is sometimes called the Arabic group, because the Arabic language is its most important representative. Under Arabic may be included ancient or classical Arabic, its descendant, modern Arabic, and southern Arabic, often improperly called Himyaritic, including the closely related dialects of Sabæan and Minæan. The great work in ancient Arabic is the Quran, composed by Mohammed (570–632 A.D.), although a few poems are older than this. Printed modern Arabic is substantially the same wherever found and does not differ greatly from the ancient language. The spoken language, however, is divided into many dialects, of which the most important are those of Syria, Egypt, Mesopotamia, Tunis, Malta and Oman and Zanzibar. Under the general head of modern Arabic may be included the very extensive Arabic literature from soon after the time of Mohammed down to the present time. Sabæan and Minæan are found in inscriptions, chiefly in southern Arabia. These are of uncertain date, although it is now often claimed that the earliest Minæan inscriptions are earlier than 1000 B.C., while the oldest Sabæan are somewhat later. Modern representatives of these dialects are found in the present dialects of the same region, of which little is known, two of them being the Mahrī and the Socotrī. Included in the Southern Semitic branch is also Ethiopic, or more properly Geez. This was probably a descendant of Sabæan. The ancient Ethiopic was the language of Abyssinia. It closely resembles the Arabic dialects, sharing with them some of their most characteristic features, while in many other respects it differs greatly from them. It was the spoken language of Abyssinia till about the 13th century A.D. The earliest known literature comes from about 500 A.D. Most of the literature consists of translations from other languages. The most important documents are the translation of a part of the Bible, made about 500 A.D., and the apocryphal book of Enoch, which is a translation from a lost original. Modern representatives of the language in the same region are the Tigré, the Tigrina and, with extensive incorporation of foreign elements, the Amharic, together with dialects related to the Amharic, such as the Hararī and Gurāguē.

The Egyptian language is by some classed as Semitic. It seems evident, however, that that is not the case, but that very early, in prehistoric times, it was subjected to strong Semitic influences, doubtless from invaders coming from Asia.

The Written Characters.— The written character of the Babylonian and Assyrian languages is the cuneiform, the writing being partly ideographic and partly syllabic, but not at all alphabetic. (See CUNEIFORM WRITING). This, however, according to the common view, was not the invention of the Babylonians, but was taken by them from the earlier inhabitants of the land, the non-Semitic Sumerians. It was originally a picture writing, like the hieroglyphics of the Egyptians, but has been so largely conventionalized that in most cases the resemblance to the original picture has been lost. The Assyrian forms, when they differ from the Babylonian, show modifications in the direction of greater conventionalizing and increased regularity. Aside from the cuneiform, all Semitic languages use an alphabet, consisting entirely of consonants, which goes back to the same original forms. Ethiopic is an apparent exception, in that the vowels are written with the consonants, that is, each consonant has six or more different forms according to the vowel following it. These forms have such a resemblance to those of the other Semitic languages, however, and in particular to the Sabæan which is written without vowels, that it is probable that the earliest form contained simply the consonants, and that the modifications of form for the expression of the vowels show a later development. What is commonly regarded as the earliest form of the Semitic alphabet is usually called the Phœnician, a name given to it by the Greeks because they obtained it from the Phœnicians. But the Phœnician alphabet at the time of our earliest knowledge, about the 8th century B.C., was practically identical with the forms found at about the same time among the other Canaanites and the Aramæans. The origin of this alphabet is doubtful, the common view at the present time being that it was derived from certain Egyptian characters, while some regard it as taken from the Babylonian. After the Greeks obtained this alphabet, it passed from them to the Romans and then to the many modern alphabets derived from the Greek and Latin. The earliest inscriptions known in this alphabet are probably the ostraka from Samaria in Hebrew, of the 9th century, the Hebrew Gezer inscription, of the 8th century, the Moabite stone, about 850 B.C., in the Moabite language, a Phœnician inscription of about the same date, the Siloam inscription, about 700 B.C., in Hebrew, the Zakkūr inscription and the inscriptions from Senjirli, about the 8th century B.C., in Aramaic. All these have substantially the same forms. Within the next few centuries two types gradually arose, the old Hebrew and the Aramaic or square characters. The old Hebrew was used in writing Hebrew till the Jews adopted Aramaic as their vernacular, which was at any rate before the time of Christ, when they naturally came to use ordinarily the Aramaic form of character for the Hebrew as well. The Samaritans have always used the old Hebrew form of character, with many changes, especially in the direction of greater elaborateness. The only modern use of this form of character is in the Samaritan of the present day.

The earliest Syriac character, known as the Estrangela, was a cursive writing developed

from the Aramaic form. From this came the later Syriac forms, both Nestorian and Jacobite, and also the Arabic characters, including both the Kufic and the Neskhi.

The southern Arabic characters, found in Sabæan and Minæan, differ greatly from those already mentioned, and are perhaps earlier than any other forms which have been found. They are to be traced, however, to the same common character in an early form. The Ethiopic character is a development of the southern Arabic form.

The Ethiopic language and the Assyrian and Babylonian are written from left to right. All the other Semitic languages are written from right to left.

General Characteristics of the Semitic Languages.— The modern Semitic languages and dialects have of course been greatly changed by the influence of the other languages with which they have been brought in contact. These, therefore, should not receive a prominent place in the consideration of the general characteristics of the Semitic languages, although they may offer confirmatory testimony in some particulars. Some of these general characteristics of the ancient Semitic languages may well be noted, keeping in mind a comparison with other languages, especially with the Aryan group. It is not claimed, of course, that the characteristics which will be here named have no similarities elsewhere, but rather that they may fairly be considered general characteristics of the Semitic group, as they could not be of any other group.

The Semitic languages divide the letters into two general classes, consonants and vowels, the consonants being the more important. Roots are composed only of consonants, while the vowels are used, along with consonantal changes, to express modifications of the fundamental root idea. Although the vowels are thus important, it is in a domain entirely subordinate to the consonants. The result of this is that in all the languages except the Assyro-Babylonian and Ethiopic the consonants only were originally written, and the vowels added by means of small marks, for the most part above or below the consonants. In fact, it was only in comparatively late times that the vowels were written at all. The inscriptions, such as those of Phœnicia and of Senjirli, the Moabite stone and the Siloam inscription, have no vowels. In the Assyro-Babylonian the vowels are expressed, but the characters are usually supposed to have been borrowed, as has already been noted. In the Ethiopic the vowels are expressed by slight changes in the form of the consonant, a feature, however, which is probably to be regarded as a late development, although going back to the earliest known literature. The consonants alone were probably originally written.

Originally the Semitic languages were characterized by the possession of a large number of gutturals, some of them very peculiar. In course of time, however, part of these were lost by most of the languages, the Arabic preserving them the most fully.

The Semitic roots are almost entirely triliteral, that is, each consists of three consonants. An occasional root is found which contains four or more consonants, but these are exceptional. On the other hand, the belief is growing that many of the triliteral roots, especially some of the so-called weak roots, were originally biliteral. But here the tendency of the languages toward triliterality is seen plainly from the fact that to a large extent these roots have assumed the appearance of triliterality.

The relation between nouns and verbs is very close. In fact most of the features of inflection are the same in both, the noun being the earlier.

A prominent characteristic of verbal inflection, with many similarities in the nouns as well, is the development of many different stems or conjugations from the same root. These are formed partly by internal change in consonants and vowels and internal additions and partly by external additions. Thus one stem has an intensive meaning, another a causative, another a reflex, etc. In the original Semitic there must have been many different stems. Some have been lost in each language. The Ethiopic has preserved the largest number, next the Arabic, then the Assyrian. These stems afford a very concise way of expressing many different shades of meaning connected with a single root idea, each of which would in most languages require either a compound verb or the addition of separate words for its expression.

The languages use pronominal suffixes attached to nouns, verbs and prepositions. These are really shortened forms of the pronouns. With nouns they have the force of a genitive, with prepositions of a dative and with verbs ordinarily of an objective accusative.

The languages are distinctly objective. The personal standpoint of the speaker or writer counts for little. In the verb, the third person is the simple uninflected form, the starting point of the inflection, it is the first person in the Aryan languages. The present time, the time of the speaker or writer, is of little importance in comparison with the past and future. The use of the tenses is often based upon an assumed standpoint. So also many phases imply the assumption of a standpoint other than that of the writer or speaker.

Certain phenomena may be classed together under the general statement that they show a lack of development in the languages. This is not, however, due to lack of time or of favoring circumstances, because these features are ordinarily found to characterize in a similar way all the languages at all times and under all circumstances. These phenomena indicate rather psychological characteristics of the people, their natures are not complex, they show limitations in some directions. Certain developments which are common in Aryan languages the Semites did not feel to be necessary. Among these characteristics may be mentioned the following:

Most of the Semitic languages have only two tenses, usually called the perfect and the imperfect. Whether these differed in their fundamental meaning from some of the tenses of the Aryan languages is a question on which there is difference of opinion. The later forms of several of the languages developed a present tense from a participle, which is only suggested in the earlier usage. In general the Semitic tense usage is thus much less fully developed than the Aryan. Moods also are relatively undeveloped. They are found only in connection with the imperfect tense, even the impera-

tive being derived from it, and in most of the languages they are not widely used.

The nouns have only two genders, masculine and feminine.

There is an almost entire absence of compound words, both nouns and verbs, except in proper names.

The syntax is in many particulars of a simple and undeveloped kind. There is a strong tendency to leave much in the relation of clauses and sentences to inference. This leads to the very frequent use of parataxis. There is but a small number of particles of every kind. In most of the languages the original case endings have been lost, but there has been no great development of prepositions to take their place. There is also a scarcity of adjectives in most of the languages, so that nouns are often used in their stead.

Relation to the Primitive Language.— No existing language can be called the common mother of the other Semitic languages, nor even the most primitive in every respect. Each of the languages is probably in some features more primitive than any other. But the Arabic preserves far more that is primitive both in grammatical forms and syntactical usage than any other of the languages. This is in spite of the fact that the known Arabic literature is very late. The Arabs in their desert home remote from other nations changed the language less than other peoples in a short space of time. Thus the Arabic preserves the case endings, which have been largely lost in the other Semitic languages, except in the Assyro-Babylonian where they are often used indiscriminately. The Arabic preserves the original endings, sometimes consonants, more often vowels, both in verbs and nouns, which are largely lost elsewhere. The Arabic retains in most cases the original vowels, which in the other languages undergo various changes, such as heightening, shortening (volatilization) and contraction, although the Ethiopic has also retained many of these. The formation of the plural nouns by internal changes, the broken plurals, which is so prominent a feature of the Arabic, is only found elsewhere in Ethiopic. This was probably a primitive feature.

See ARABIC LANGUAGE; ASSYRIA; BABYLONIA; ETHOPIA; HEBREW LANGUAGE AND LITERATURE; MOAB; PHŒNICIA.

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SEMITIC NATIONS, those nations whose languages were Semitic, and which are consequently supposed to have been racially connected. It is recognized, of course, that language is not an infallible evidence of race, and that the conclusions on that point drawn from it have at least a small degree of uncertainty. But in the absence of much evidence of any other kind, the data supplied from this source must be used as a working basis. (See SEMITIC LANGUAGES). In considering the Semitic nations as a group, the first question is, of course, concerning their primitive home. Primitive is here used only in a relative sense, for the very earliest history of these nations goes back to a time concerning which, in the present state of knowledge, there is no positive information or plausible inference. The consideration of that time would involve a discussion of the origin of the whole human race, which is a question too broad to be entered upon here. By primitive home is meant, therefore, the location of the Semites when they were one people, the common distributing point of the Semitic nations. While entire certainty on this point is not attainable, yet there are some indications which may be followed.

Some have found this primitive home in Babylonia or its vicinity. For this the chief argument is based upon language. A consideration of the words common to all the Semitic languages is thought to point to the conditions prevailing in Babylonia, or in some adjacent country from which Babylonia was the first stopping place of the undivided race. But this argument from language is inconclusive, in view of the possibility of the disappearance from a language of words once common, and also of the borrowing by one Semitic language from another. The fact that the known history of Babylonia extends back to a point much earlier than that of any other Semitic nation has very little to do with the question.

There are many arguments in favor of Arabia, that is, central and northern Arabia, as the primitive home. Arabia is a country which is largely desert, except in the southern part. Such a country, it is said, best explains the racial characteristics. These characteristics, as usually given, are intensity of faith, ferocity, exclusiveness and imagination. It is also said that the Arabs have preserved the Semitic character and characteristics in their purest form. Certainly those characteristics which have just been mentioned are found combined among the Arabs more fully than elsewhere. A desert origin seems, also, to explain most satisfactorily some features of the Semitic languages. This is true especially of the great predominance of gutturals. Such a development of these as was found in primitive Semitic demands good physical powers, which would come from an outdoor life in a pure atmosphere, and plenty of leisure for conversation. These conditions are met in Arabia. In this connection it is important to note that the Arabs have preserved the gutterals more fully than any other Semitic nation, the others having considerably modified their primitive habits of life. Again, it is by some regarded as a universal law that nomads may adopt settled habits of life, but that the reverse process does not take place. This rule perhaps is not invariable, yet it does represent the usual tendency. When,

therefore, we find some Semitic nations nomadic and others not, it follows that the nomadic form of life is probably the earlier. For this nomadic form of life the natural location is Arabia. Further, the close resemblance of the Semitic languages to one another, much closer than in any other known group of languages, indicates some of the early conditions surrounding the nation. It suggests that the primitive nation lived in a comparatively limited space for a long period of time before being divided, giving opportunity for much common development of the language and also that it was largely isolated from other nations who would influence the language. Such a country of moderate size, in comparative isolation from other countries, is Arabia alone in the region inhabited by Semitic peoples, or in their vicinity.

Another view is that the primitive home was in Africa. According to this view, however, as ordinarily held, the Semites very early migrated into Arabia and there lived for a long period of time before any division took place. This view would, therefore, make Arabia the centre of distribution for the Semitic nations. Hence the arguments already adduced in favor of Arabia would still be valid upon this view, but additional arguments are presented in favor of going back one step further to an African home. In support of this view the chief argument is that there is supposed to be a racial connection between the Semitic and Hamitic peoples. By Hamitic peoples are not meant the negroes, but the Egyptians, Berbers, etc., although it is by no means certain that the Egyptians are Hamitic. For this racial connection there are two chief arguments. One is from resemblance in physical characteristics, concerning which, however, the evidence is inconclusive. The other is from resemblance of the languages and is of greater force. The general resemblance between the Hamitic and Semitic groups of languages are the following: the pronouns are similar; the verbs have similar tenses and formation of stems; it is claimed by some that the Hamitic roots, like the Semitic, were originaliy triliteral; the ending for feminine gender is the same, *t;* several of the numerals are very similar; both groups form nouns by means of a prefixed *m;* both write without expressing the vowels; and 50 or more words of ancient Egyptian are said to be identical with Semitic words. The possibility of accounting for these resemblances by borrowing from the Semitic languages by the Hamitic does not seem, however, to be entirely excluded. Of course, not all of the resemblances are such as are most liable to be borrowed, but any of them might be. The possibility of such borrowing is increased, too, by other considerations. For the Egyptian resembles the Semitic languages more than any other Hamitic language. And it has been thought, on other grounds, that Egypt has been subject to Semitic influences in early times. Some have believed, for example, that certain features in early Egyptian civilization were taken from the Babylonians. Others have thought that Arab invaders came into Egypt in early times. Such a relationship as is claimed between the Semitic and Hamitic races can not be said, therefore, to be yet established. And even if there were such a relationship, no sufficient reason appears for thinking that the primitive race must have had its home in Africa rather than in Arabia.

The conclusion that the earliest known home of the Semites was in Arabia may be said, therefore, to be reasonably well established. The arguments which are thought to show a previous residence in Africa are inconclusive. That view can only be regarded, in the present state of knowledge, as a conjecture with very little evidence to support it.

Separation into Nations.— Concerning the precise, or even approximate, date of the separation of each nation from the parent stock nothing is known. The recorded history of every Semitic nation begins long after that time. Even the order of departure of the different nations is not certain. Here, however, the languages themselves come in to supplement our direct knowledge. On account of the resemblances of the languages to each other, the order of separation is often stated thus. All the other groups departed from the southern, that is, migrated from Arabia, and settled in Babylonia and its vicinity. After dwelling here together for a long time, the Arameans first separated, then the Canaanites, and finally the Assyrians. There was also emigration southward, giving the southern Arabs, a branch of whom ultimately migrated to Abyssinia. It is doubtful, however, whether this outline is correct in all details. It assumes that the Canaanites are more closely related to the Babylonians than are the Arameans, while in reference to some features of the languages the reverse is true. It also presents difficulties in accounting for the Arameans from the time of such separation until their appearance in history. For while some had settled in upper Mesopotamia at an early time, yet the Assyrian inscriptions indicate that fresh streams of migration were coming into upper Mesopotamia, and into Babylonia and Assyria, for a considerable period of time before and after 1000 B.C., apparently from Arabia. It seems probable then, that at the first general separation between north and south, the ancestors of the northern nations went not to Babylonia, but to northern Arabia. After a considerable sojourn there, the Babylonians continued their journey to Babylonia, and part or all of the Canaanites, after a time, went on to Canaan, while the Arameans remained in northern Arabia, from which region successive waves of migration swept over Mesopotamia, Syria and their vicinity. The nomadic habit of life of many of the Arameans, which seems to be indicated in the Assyrian accounts, also points to such a residence in Arabia as is here indicated. Contact after the original division doubtless had much influence on language. The Arameans were probably thus influenced by the Arabs and by the Babylonians. The Babylonians themselves were also influenced by the Arabs with whom they had commercial intercourse in early times. Further, the Canaanites were without doubt influenced by the early intercourse between Babylonia and the region of Palestine.

The Individual Nations.— The earliest Semitic nation of which we have any history was in Babylonian. Their own records, which begin perhaps about 3000 B.C., give the first information concerning them. The earliest inscriptions show them already in Babylonia, but there are indications, as usually understood. of early con-

flicts with the original Sumerian inhabitants in southern Babylonia. Ultimately, however, the Sumerians became subject to the Babylonians and were gradually incorporated by them. In course of time the people of Babylonia became a mixture of various elements, Semitic and non-Semitic. The non-Semitic Elamites and Kassites had dominion over the land at various times, and must have contributed materially to the population. In the course of their history also it is probable that many Arabs and Arameans were incorporated into the population. The Babylonians remained a distinct people until their conquest by the Persians under Cyrus in 538 B.C., after which time they never again became independent, and doubtless were mingled with the Persians and others with whom they associated. The Babylonians were never nomads in historical times, but dwelt largely in cities. In all early history and to about 2000 B.C., the government was one of cities, with no power actually supreme. The Babylonians were not unwarlike, but were especially devoted to religion, commerce, science and education. Assyria was doubtless settled by colonists from Babylonia somewhat before 2000 B.C., and was at first subject to Babylonia. From about 1500 B.C., however, the nation was independent, and for most of the period from 745–606 B.C. held Babylonia in subjection, as well as at times before 745. Their national history ended with the capture of Nineveh by the Medes in 606 B.C. The Assyrians were much more warlike than the Babylonians, and considerably given to commerce, but cared much less than the Babylonians for religion, science and education.

The Arameans were not one nation, but rather many tribes. They came in waves of migration from Arabia to the frontier of Babylonia, and to upper Mesopotamia and finally reached the country later called Syria. In the Old Testament, Arameans are alluded to in connection with Abraham and his descendants, especially Jacob. The earliest mention of the Arameans elsewhere is probably in the Tell el-Amarna letters in the early part of the 14th century B.C. The Assyrian kings also speak of them from time to time in their inscriptions, beginning in the 14th century. From all indications it would seem that their earliest settlement of importance was in the upper Mesopotamia, between the rivers Euphrates and Khabur. This settlement was reinforced by fresh arrivals from time to time. Just when they passed over the Euphrates and occupied Syria is uncertain, but the indications suggest that somewhat before 1000 B.C. they had obtained possession of most of the country, especially the northern and middle portions, defeating and driving northward the Hittities who had previously possessed the country. About the same time they began to come in large numbers into the territory of Assyria and Babylonia, especially along the Euphrates. In the times of Tiglathpileser III and later, 745 B.C. and afterward, they also had settlements along the lower Tigris. In the earliest notices of them they were largely nomadic, but they soon turned to settled habits of life. In their government there was little unity; each political division consisted of a strong city and the people inhabiting a greater or less amount of territory around the city. Several of these city states would unite for a campaign, but these leagues never lasted long. The Old Testament speaks of the Arameans in connection with several cities, namely, Damascus, Zobah, Maakah and Beth Rehob. Other prominent cities of the Arameans were Hamath in Syria and Haran in Mesopotamia. Upper Mesopotamia is spoken of in the Old Testament as a region by the names Aram Naharayim and Paddan Aram. The most powerful of the Arameans were included in the kingdom of Damascus, but their power was broken when Damascus was captured by Tiglathpileser IV about 732 B.C. After this time the population of Syria and upper Mesopotamia no doubt continued to be largely Aramean for centuries, although the people did not form a nation, and had little political power. Of the many who used the various Aramean languages and dialects after this time (see SEMITIC LANGUAGES), it is probable that a large part were Arameans. But naturally many others were mingled with them, so that in their latter history the Aramaic-speaking people represented a mixture. The language was also adopted by those who were not Arameans, as, for example, by the Jews. Some who have left inscriptions in the language were not Arameans, but Jews and Arabs. The Arameans were a people of considerable warlike ability, although with little taste for political organization, and were much given to commercial pursuits.

All the Canaanite Semitic nations aside from the Hebrews, namely, Canaan, Ammon, Edom, Moab and Phœnicia, were occupying their respective countries before the arrival of the Hebrews from Egypt, how long before is not known with certainty. The Phœnicians are mentioned in Egyptian records as early as the 16th century and are prominent in the Tell el-Amarna letters. The Phœnicians were distinguished beyond any other Semitic nation as a commercial people, especially on the sea, and were great colonizers. Their form of government was the city state, Tyre and Sidon being the two most prominent cities. Whether the Hebrews were actually Canaanites or were a branch of the Arameans is uncertain, the indications for the latter view coming entirely from the Old Testament. If this view be correct, the Hebrews spoke Aramaic on their arrival in Canaan, and learned the Canaanite language from the people there. The other view is, however, rather more probable, according to which the Hebrews were themselves a branch of the Canaanites, although traditionally associated with the Arameans in the experience of Abraham, the founder of the nation, and his immediate descendants. The earliest statements concerning Abraham in the Old Testament connect him with the city Ur in Babylonia. Both the Old and New Testaments originated among the Hebrews. The Hebrews were not particularly distinguished as warriors, and in ancient times had no inclination toward commercial pursuits.

If the earlier conclusions concerning Arabia as the distributing point of the Semites are true it is evident that after the departure of the nations hitherto mentioned the Arabs remained by themselves in central and northern Arabia at a period long before we have any record of

them. There are no indications in the early history that the Arabs had a centralized government. Rather it would seem that, being nomadic, they were early separated into many different tribes, having no political unity. They are mentioned quite often by the Assyrian kings who fought against them, beginning with Shalmaneser III in 854 B.C. Their chief military activity came during and after the time of Mohammed.

Of the time of migration into southern Arabia there is no definite information. Southern Arabia is of a different character from the rest of the land, being fertile and adapted to agriculture. The immigrants here naturally abandoned the nomadic habit of life. The knowledge of these south Arabian kingdoms comes chiefly from their own inscriptions, whose date is by no means certain. It is now thought, however, by those who have given special attention to the matter that the earliest south Arabian kingdom was the Minæan, extending from about 1250–600 B.C., at the latter date being conquered by the Sabæans, while the Sabæan kingdom lasted from about 750–100 B.C. Both were evidently kingdoms of considerable power. Probably about 350 A.D. some Sabæans migrated to Abyssinia, and there founded the kingdom of Aksum, where the language called Ethiopic was spoken.

Characteristics of the Semitic Peoples.—It is evident that the Semites as a whole were decidedly religious. But it is now evident that there was no Semitic tendency to monotheism, as was formerly supposed. The three great monotheistic religions of the world, to be sure, Judaism, Christianity and Mohammedanism, have come from the Semites. But Mohammedanism was strongly influenced by Judaism, and Judaism and Christianity owe more of this teaching to the work of great individuals than to any natural tendency of the Hebrews. The Hebrews had, in fact, a tendency to polytheism, as is shown by their history in the Old Testament. The Arabs were polytheists before the time of Mohammed. All the other Semitic nations, so far as we know, were polytheistic.

In considering other characteristics and achievements of the Semites, especially in comparison with the Aryans, it needs to be remembered that the prominence of the Semitic nations precedes that of the Aryans. Hence the Aryans have been able to profit by whatever was good in the Semitic achievements. Considered in the light of their own times, the Semites were not deficient in those traits which have distinguished the Aryans. Usually, however, not more than two or three Semitic nations have manifested conspicuously any one of such traits. In warfare the Arabs, under Mohammed and his successors, the Assyrians and the Babylonians achieved signal success. The Assyrians, for their own time, were great organizers of conquered territory. The scientific attainments of the Babylonians were such that nearly all nations of antiquity learned many things from them, such as astronomy and mathematics. The Assyrians and Babylonians showed much artistic ability. Much of the literature of the Semitic nations is imaginative, especially the poetry and mythology.

See ARABIC LITERATURE; ASSYRIA; BABYLONIA; ETHIOPIA; HEBREWS; LANGUAGE; LITERATURE; PHŒNICIA; SYRIA.

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SEMLIN, ZEMUN, a city of Jugoslavia, at the junction of the Danube and Save rivers, opposite, and four miles from Belgrade. It has a large transit trade, and is the seat of an Orthodox bishop. In 1914 the city was evacuated and reoccupied twice by the Austrians. It suffered greatly from repeated bombardment. Pop. about 25,000.

SEMLIN, Charles Augustus, Canadian statesman: b. Ontario, 1836; d. 1917. He went to British Columbia in 1862, spent some years in the Cariboo district and settled at Cache Creek. He was largely interested in agriculture and in the meat industry. He served many years in the assembly of British Columbia and was Premier in 1898–1900. He was afterward Commissioner of Lands and Works, Provincial Secretary and Minister of Education.

SEMMERING, zĕm'ĕr-ĭng, Austria, an Alpine pass on the borders of Styria and Lower Austria, 44 miles southwest by west of Vienna. The road over the Semmering Pass (2,940 feet) is of ancient date and here between 1848 and 1853 was built the famous Semmering Railway, the first of the European mountain railways. The railway begins at Gloggnitz and is carried along the face of precipices by means of 15 tunnels and 16 viaducts to Mürzzuschlag. The scenery along this portion of the line is of the grandest and most picturesque description. At its highest elevation, 2,891 feet, the line pierces the Semmering in a tunnel 4,667 feet long. Its entire length is 25 miles and it was constructed for the Austrian government at a cost of about $7,000,000.

SEMMES, sĕmz, **Raphael,** American naval officer: b. Charles County, Md., 27 Sept. 1809; d. Mobile, Ala., 30 Aug. 1877. He became a midshipman in the United States navy in 1826, a lieutenant in 1837, was volunteer aide to General Worth in the Mexican War and secretary to the lighthouse board in 1859–61. Upon the secession of Alabama he resigned his commission and was assigned to the command of the steamer *Sumter,* the first vessel of the Confederate navy. With this ship he cruised with success against Northern commerce in the West Indies. He then had the swift steamer *Alabama,* or No. 290, built in England, and in September 1862 started on his well-known voyage. He flew British colors when approaching his prey, hoisting the Confederate ensign when sure of his prize. His seamen were chiefly English. After a destructive career, during which he captured 64 vessels and burned all but seven, his ship was sunk off Cherbourg Harbor, France, by the Federal steamer *Kearsarge.* Subsequent to the war he practised law. His writings include 'Afloat and Ashore During

the Mexican War' (1851); 'The Cruise of the Alabama' (1864); 'Campaign of General Scott in the Valley of Mexico' (1852); 'Memoirs of Service Afloat During the War Between States' (1869).

SEMNOPITHECUS, a genus of Asiatic monkeys, the langurs, including species possessing an elongated tail, cheek pouches and ischial callosities. All of this genus are inhabitants of Asia and Asiatic islands. The sacred entellus monkey is a familiar example. See LANGUR.

SEMOLINA, hard grains of wheat left in the bolting cloth when the fine flour has been passed through its meshes and some times manufactured by millers. Certain hard, large-grained wheats growing in southern Europe produce the best semolina, which is used for thickening soups, for macaroni, for a French bread, as an addition to the Italian polenta and is employed in puddings, especially in England.

SEMPACH, zĕm'päH, Switzerland, in the canton of Luzerne, lies eight miles northwest of the town of Luzerne, on the lake of the same name. It is a walled town and its chief interest consists in its having been one of the outposts of the Swiss in their conflict with Austria. The battle of 9 July 1386, in which the Austrians under Duke Leopold received a crushing defeat at the hands of the confederated Swiss, was fought under its walls — a victory the more remarkable as won against extraordinary odds, and in which the famous Winkelried was the hero; the duke with 600 knights were left upon the battlefield. The anniversary of this victory is always celebrated on this spot by prayers and thanksgiving. Pop. 1,200.

SEMPER, zĕm'pĕr, **Gottfried,** German architect: b. Hamburg, 29 Nov. 1803; d. Rome, 15 May 1879. He attended the Johanneum of his native town and studied law in the University of Göttingen, but changed to the profession of art, having been attracted to the study of architecture under Gau. He then took a journey through Italy, Sicily and Greece. On his return he published 'Bemerkungen über bemalte Architektur und Plastik bei Alten' (1834), and the essays 'Die Anwendung der Farben in der Architektur und Plastik' and 'Dorisch-Griechische Kunst in 6 Tafeln mit Farben' (1836). He became the pupil of Schinkel in Berlin, who ungrudgingly recognized his talent and educated him to fill the place of professor of architecture in the Dresden School of Building. Between 1837–41 he built several important structures in Dresden, including the Court Theatre, and in 1849 traveled to Paris and London, in which latter city he undertook, among other things, the arrangement of the statuary in Kensington Museum. He was active up to the time of his death in Dresden, Vienna and other places, where his work is still a commanding feature of city architecture. He was an uncompromising adherent of the Renaissance style, as far as this was founded on the Roman of the later empire, especially as exhibited in the composition of the forums. His buildings are distinguished for harmony of composition together with purity and moderation of detail. Among his many works on architecture may be noted 'Uber Poly chromie und ihren Ursprung' (1851); 'Wissenschaft, Industrie, und Kunst' (1852), and 'Der Stil in den technischen und techtonischen Künsten' (1860–63). Consult Lipsius, 'Gottfried Semper in seiner Bedeutung als Architekt' (1880).

SEMPER, Karl, German naturalist: b. Altona, Germany, 6 July 1832; d. Würzburg, Bavaria, 29 May 1893. He was educated at Kiel, Hanover and Würzburg, traveled extensively in Europe and was engaged in a tour of the Philippines, China, Japan and the South Sea Islands in 1858–66. On his return he was appointed to the chair of zoology at Würzburg which he occupied until his death. He delivered a course of lectures before Lowell Institute of Boston in 1877, afterward published under the title 'Animal Life as Affected by the Natural Conditions of Existence' (1881). He edited nine volumes of 'Arbeiten aus dem Zoologischen Institut' in Würzburg, and also wrote 'Reisen im Archipel der Philippinen' (1867–72); 'Die Palau Inseln im stillen Ozean' (1873); 'Die natürlichen Existenzbedingung der Thiere' (1880), etc.

SEMPILL, Robert, Scottish ballad writer: b. about 1530; d. 1595. He was probably a cadet of the house of Sempill, of illegitimate birth; received an excellent education; spent part of his early life in Paris, and upon his return to Scotland went into military service. He ardently supported the Reformation in Scotland in his writings and severely attacked the Catholic cause. The majority of his poems have been preserved in the original, the most noteworthy of them being 'Ane Complaint upon Fortoun' (1581); 'The Legend of the Bischop of Saint Androi's Lyfe' (1584), and the 'Sege of the Castel of Edinburgh.' Two complete editions of his writings were published, 'The Sempill Ballates,' edited by T. G. Stevenson (Edinburgh 1872), and 'Satirical Poems of the Time of the Reformation' (edited for the Scottish Text Society by James Cranstoun, 2 vols., Edinburgh 1889–93). The last two poems were included in the 'Scottish Poems of the Sixteenth Century' (edited by Sir John Graham Dolyel, 2 vols., Edinburgh 1801).

SEMPLE, Ellen Churchill, American anthropogeographer: b. Louisville, Ky., 1863. She was graduated at Vassar College in 1882 and in 1891–92 and 1895 studied at Leipzig. She has specialized in the study of the effect of geography on the development of races and on national life. She was professor of anthropogeography at Clark University from 1921 to 1928. She was a contributor to the *Bulletin* of the American Geographical Society and the *Geographical Journal* (London). Gold medalist, 1914, American Geographical Society. Author of 'American History and Its Geographic Conditions'; 'Influence of Geographic Environment' (1911). She died 8 May 1932.

SEMPRINGHAM, Order of. See ORDERS, RELIGIOUS.

SEN, Keshub Chunder, an Indian religious reformer: b. village of Garifa (Gouripore), Bengal, 19 Nov. 1838; d. 8 Jan. 1884. His education was partly Hindu and partly English. He became attracted in 1858 to the Brahmo-Somaj, the Theistic Church of India, so much so that he soon began a campaign of religious reform for the regeneration of his fellow-countrymen. In 1865 a split in this Church oc-

curred, and one part known as the Brahma Samaj of India, came under the vigorous leadership of Sen. Until his death in 1884 Sen extended the movement's influence throughout India, initiated social reforms, and sought to develop a Christian-like personal religion among his followers. Quality rather than quantity characterized the movement. But while the intellectuals among its adherents, particularly in Calcutta, abandoned traditional Hindu observances, they adopted nothing in their place except positivism or agnosticism. In 1878 dissensions arose among Sen's followers and his congregation split. The last few years of his life were full of controversy, illness, and disappointment.

SENANCOUR, sā-näN'kōōr, **Étienne Pivert de,** French writer: b. Paris, France, Nov. 16, 1770; d. Saint Cloud, Jan. 10, 1846. Destined by his father for the priesthood, he went to Switzerland in 1789 to avoid attending a seminary. His marriage to a young Frenchwoman at Fribourg the following year was not happy. During the French Revolution he was included in the list of emigrants, and most of his fortune in France was lost. He returned to France permanently in 1803. Sénancour was a great admirer of Jean Jacques Rousseau, who inspired much of his *Rêveries sur la nature primitive de l'homme* published at Paris in 1799, and his best-known work, *Obermann,* an autobiographical epistolary novel published in 1804. It is characterized by romantic descriptions of nature and deep pessimism, and some of its philosophical passages are highly original. It was translated into English by A. G. Waite in 1903. Sénancour's other writings include *De l'amour selon les lois primordiales* (1805); and *Isabelle,* another epistolary novel (1833).

SENATE, an assembly or council with the highest deliberative and legislative functions. The word is derived from the Latin *senatus* which means literally an assembly of old men. In ancient Rome the senate was the supreme council of state. Originally it was merely an advisory council of patricians, but during the republican period it exercised broad legislative and administrative powers and plebeian members were admitted. The word also is applied to the upper house of the legislatures of certain countries such as France, Italy, Canada, Argentina, and the United States and to the governing bodies of certain universities.

UNITED STATES

In the United States the term Senate is applied to the upper house of Congress and of each state legislature (with the exception of Nebraska which has a unicameral legislature). The state senate, and indirectly also the United States Senate, had its origin in the English colonies—in the governor's council which served two broad functions: (1) executive, to advise the governor and to confirm his appointments; (2) legislative, to act as a second chamber in passing laws. In the early states (after 1776) these councils were transformed into state senates; and they set the pattern for the Senate of the United States as well.

The sovereignty of the states is recognized through their equality in the United States Senate, although the two senators from each state vote as individuals. The Constitution forbids a denial to any state, without its consent, of its equal representation in the Senate.

The original device of choosing senators through election by the state legislature was set aside by the 17th Amendment to the Constitution (May 31, 1913), which provides for direct election by the people. Congress may regulate the times and manner of choosing senators (U.S. Constitution, Art. I, sect. 4), but the fixing of suffrage provisions for voters is left to the states through the provision that "electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislature" (17th Amendment). Senators are elected for six-year terms, and a third of the total Senate membership is elected every two years. The governor may appoint a senator if a vacancy occurs and may also call for an election to fill out the unexpired term. It has become the practice in many states to hold such an election with regular elections, thereby saving the expense of special elections.

The qualifications for a senator (Art I, sect. 3) are that he must be 30 years of age, a citizen of the United States for nine years, and a resident of the state from which he is elected. The Senate makes its own rules and is the judge of the election and qualifications of its own members. By a two thirds vote it may expel a senator, and by a majority vote it may refuse to seat an incoming member. Such refusal took place in 1927–1929 when Frank L. Smith of Illinois and William S. Vare of Pennsylvania were denied seats in the Senate because of questions raised concerning campaign contributions. Senators enjoy immunity for what is spoken on the floor of the Senate, and by implication also for what is said in the conduct of committee business. They are exempt from arrest, except for treason or felony or breach of the peace, while going to, returning from, or during a session.

The salary of a senator is $12,500 per year, with an additional nontaxable allowance of $2,500 for expenses. Each senator has an administrative assistant with a salary of $10,000, and is allowed between $20,000 and $30,000 more for clerks, according to the population of his state. Senators receive 20 cents a mile for travel expenses for attendance at a session of Congress, and they have free mailing privileges for the conduct of official business.

The vice president of the United States is president of the Senate, but he may vote only in case of a tie. (In many state senates the lieutenant governor performs a similar role.) The Senate elects from its own membership a president pro tempore who serves in the absence of the vice president and takes over the duties and salary of the president of the Senate if and when the vice president succeeds to the presidency (an eventuality that has occurred seven times). The highest ranking senator (in terms of years in the Senate) from the majority party is generally designated president pro tem. Other officers include the chaplain, secretary, and sergeant at arms.

There are 15 standing committees in the Senate, composed of members from both political parties in the same ratio as these parties bear to the whole body. If a party has 60 per cent of the total number of senators, it will place nine of 15 members on a committee, or three fifths of whatever number the committee may have. The chairman of each committee is the senator having

seniority among the senators of the majority party on that committee.

In lawmaking function the Senate is coordinate with the House. Even the privilege of the latter body to originate money bills is of little importance in the light of the Senate's power to amend any bill. The special powers of the Senate are of tremendous significance. These are executive in nature: (1) power to ratify a treaty by a two thirds vote and (2) power to confirm presidential appointments by majority vote. The practice of "senatorial courtesy" has in effect transferred appointing power over many positions to the individual senators. By it the Senate will not confirm an appointment of an officer to serve in a federal position in a given state—such as federal judge, attorney, marshal, collector—if such person is not acceptable to the senator (or senators) from that state. This principle once led to the rejection of a candidate for a position on a regulatory commission having national scope, because the appointee resided in the state of an objecting senator.

Almost unlimited debate is the practice in the Senate. Cloture—an agreement to limit debate and to adhere to a specified time for a vote—is possible under certain conditions. If 16 senators sign a request, there must be a vote on a cloture resolution which becomes effective when approved by a vote of two thirds of the total membership, namely 64 senators.

After impeachment proceedings have been started by action of the House of Representatives, the Senate sits as a trial court. If the president is impeached, the chief justice presides over the Senate. Conviction of impeachment by a two thirds vote of the Senate carries the penalty of removal from office and disability to hold any other office under the United States. A person so convicted is still subject to criminal prosecution.

After 1793 the Senate changed from secret to open sessions, though it still on occasion employs "executive sessions" for consideration of confidential data. (See also CAUCUS; CONGRESS OF THE UNITED STATES; HOUSE OF REPRESENTATIVES.)

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SENDAI, sĕn-dī, city, Japan, capital of the Miyagi prefecture, on northern Honshu Island, near the east coast, about 190 miles northeast of Tokyo. The largest city in northern Japan, Sendai is an important educational center with Tohoku Imperial University, founded in 1907, and the Industrial Art Research Institute, founded in 1928. It also is a manufacturing center for silk textiles and yarn, lacquer ware, and pottery. Woodworking is carried on, and there are sake and beer breweries. Sendai was the stronghold of the 17th century feudal lord Date Masamune, and there are ruins of his daimio castle with a memorial to him. Pop. (1947) 293,816.

SENEBIER, sĕ-nĕ-byā′, **Jean,** Swiss naturalist: b. Geneva, Switzerland, May 6, 1742; d. there, July 22, 1809. After some years in the ministry, he became a librarian in Geneva in 1773, and at the same time began the study of plant physiology, to which he made important contributions. His discovery that plant nutrition is dependent upon sunlight was published in his *Physiologie végétale* (1782–1788) and other works. Among his major writings were *Histoire littéraire de Genève* (1786); *Essai sur l'art d'observer et de faire des expériences* (1802); and *Rapport de l'air atmosphérique avec les êtres organisés* (1807).

SENECA, sĕn′ĕ-kà, **Marcus** (or **Lucius**) **Annaeus** (called SENECA THE ELDER), Roman rhetorician: b. Corduba (now Córdoba), Spain, 54 B.C. ?; d. 39 A.D. The father of Lucius Annaeus Seneca, he wrote ten books of *Controversiae,* discussing 74 imaginary legal cases and methods of presenting them. An epitome of the whole and five of the ten books are extant. His *Suasoriae,* of which one book is extant, contains rhetorical exercises. He also is the author of a lost work on the history of Rome.

SENECA, Lucius Annaeus, Roman philosopher and statesman: b. Corduba (now Córdoba), Spain, 4 B.C.?; d. near Rome, 65 A.D. As his family was wealthy and of equestrian rank, the boy was brought to Rome to be educated for the bar and an official career. He also attended with enthusiasm the lectures of several noted Pythagorean, Stoic, and Cynic philosophers. He gained great fame for eloquence and entered the Senate through the quaestorship; but in 41 A.D., at the instance of the Empress Messalina, who accused him of an intrigue with Julia Livilla, sister of the late Emperor Caligula, he was banished to Corsica. From there he sent to his mother, Helvia, the charming *Consolatio,* but exhibited little fortitude in his exile. Finally, in 49, Agrippina, who, after the execution of Messalina, had married the Emperor Claudius, secured Seneca's recall that he might act as tutor to her son Domitius (later the Emperor Nero), then 11 years of age. At Nero's accession in 54, Seneca wrote the curious political satire (still extant) on the death of Claudius, commonly known as *Apocolocyntosis,* meaning "pumpkinification," a word formed upon the analogy of *apotheosis,* "deification." During the first years of the new reign, Seneca, in conjunction with Sextus Afranius Burrus, prefect of the Praetorian Guard, was, on the whole, successful in keeping Nero within the bounds of humanity. Agrippina, ambitious and cruel, was determined to rule the state through her son, and Seneca seems to have palliated the latter's excesses in order to destroy his mother's influence over him. Finally, when Poppaea Sabina, with whom Nero had become infatuated, induced him to order the assassination of his mother, Seneca wrote for the emperor a letter to the Senate, asserting that Agrippina had conspired against his life, and had committed suicide upon being discovered. The death of Burrus in 62 made Seneca's position quite insecure. Nero fell into the hands of men like the infamous Ofonius Tigellinus; money was needed to meet his extravagant expenditures and Seneca had become enormously wealthy. Foreseeing his probable ruin, he offered to resign to Nero all that he had, and, upon receiving a declination, couched in terms of specious affection, retired into the country and lived with utmost simplicity. In 65 he was implicated in the conspiracy of Gaius Calpurnius Piso and was ordered to commit suicide. With his wife, Paulina, who insisted on dying with him (see the affecting account in Tacitus, *Annals,* XV, 60-64), he opened the veins of his arms. Paulina's life was barely saved by her slaves; Seneca, after suffering prolonged

agony, during which he displayed the utmost serenity, was finally suffocated in a vapor bath. "Nothing in life became him like the leaving it." He was undoubtedly an earnest seeker after truth and right. The Roman world was much his debtor for the wise and humane administration of the state during the "golden quinquennium" of Nero; but he lacked real strength of character, and in his connection with Nero too often acquiesced in the doing of positive evil that a greater good might be accomplished. As a man of letters, he is incomparably the most brilliant figure of his time. He was an extremely prolific writer, his subjects are exceedingly varied, the ideas usually nobly conceived and eloquently expressed. In striking contrast to the periodic style of Cicero, he loves short, epigrammatic sentences. He is an expert in the use of every variety of rhetorical ornamentation, which, in harmony with the prevailing taste, he carries to excess. Though by no means a profound thinker, he is broad-minded and sympathetic in his presentation of the ethical principles, Stoic in the main, by which man's daily life should be guided. He was, indeed, by certain Fathers of the Church believed to have been a Christian, and there are still extant 14 letters, undoubtedly spurious, of a correspondence with Saint Paul. His moral essays embrace 12 so-called dialogues, *On Peace of Mind, On Anger, On the Shortness of Life,* etc.; 3 books *On Clemency,* addressed to Nero; 7 *On Benefits,* and 20 books of *Letters to Lucilius.* With these may be grouped the seven books of *Naturales Quaestiones,* which handle physics as a basis for ethical reflections. We possess also nine tragedies, composed rather to be read aloud than to be acted, and so rhetorical in substance that, though fine passages are not lacking, they are rather declamations than real poetry. They had, however, a great influence upon the drama of the 16th century.

Bibliography.—The best text of the prose works is by F. Haase in the Teubner series (1893–95); of the tragedies, by F. Leo (Berlin 1878–79.) The *Apocolocyntosis* has been edited by A. P. Ball (New York 1902). Consult also Merivale's *History of the Romans under the Empire* (cc. 50, 52-24); Zeller's *Eclectics* (London 1883); Farrar's *Seekers after God* (London 1886).

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SENECA, a tribe of North American Indians belonging to the Iroquois family, and one of the Five (later Six) Nations League of the Iroquois, founded about the year 1570. Their own name is *Tsonondowanenaka,* or *Tsonondowaka,* "people of the great hill or mountain," probably referring to the lofty eminence south of Canandaigua Lake. The term Seneca is a Mohawk rendering of this latter name, which has passed through Dutch to English hands. With the Mohawks and the Onondagas, the Senecas constituted the elder phratry of tribes in the social and political organization of the confederation, while the junior phratry was composed of the Oneidas and the Cayugas. The earliest known council fire of the Seneca people was established south of Lake Canandaigua, while their territory comprised the region environing Seneca and Canandaigua lakes and extended westward to Genesee River. As a member of the League, the Senecas were called *Honĕñninhohoñte,* signifying, "They are fixed to a door or door-flap," denotive of the fact that the Seneca people were the political doorkeepers of the League, not because, as commonly asserted they stood at the western frontier of the territory of the confederation, but because being at first averse to joining the League, they were finally persuaded to do so by having the honor of the office of doorkeeper and of official executioner bestowed upon them. Their last two League chiefs or rulers were charged with the duty of ascertaining the good or evil designs of any alien who might seek to enter the jurisdiction of the confederation. It was the policy of the Dutch of New Netherland to maintain an alliance with the League to guard against French encroachments. After 1664 the English pursued the same policy.

During the American Revolution the Senecas espoused the cause of Great Britain against the colonies. Today the Senecas are represented by several different bodies of people dwelling in diverse places and under various forms of government. In New York, according to a Bureau of Indian Affairs report of 1945, they numbered 2,879, scattered among the Tonawanda, Cattaraugus, Allegheny, Onondaga and Tuscarora reservations. There is a remnant in Pennsylvania, on the Cornplanter reservation, and about 300 in Ontario, chiefly on the Grand River reservation. In addition there were 524 so-called "Senecas" in Oklahoma, but these are not included with the foregoing, as it is doubtful whether they were ever true Senecas. The earliest estimate of the numbers of the Senecas, in 1660 and 1677, give them about 5,000. In 1825 those in New York were reported at 2,325. Morgan, 25 years later, estimated them at 2,712, with over 200 more on the Grand River reservation in Canada. About the same estimation was given in 1909.

Skaniadariio, or Handsome Lake, the founder of the reformed pagan Iroquoian religion in vogue today among the various northern Iroquoian peoples, was a Seneca. On the migration, or probably expulsion, of the Awenrehronon from the headwaters of Genesee River, New York, in 1639, and on the later defeat of the Neutral Nation, about 1649–1650, and of the Eries about 1654–1657, the Senecas moved some of their settlements and colonies westward toward Lake Erie and along the Allegheny River. In 1657 there were 11 different alien tribes or peoples represented among the Senecas, thus indicating how well they exercised the right of adoption to replace their great losses in the almost interminable wars of the League, which had then lasted about 75 years. Of the several tribes formerly constituting the League of the Iroquois, the Senecas are the most progressive in the arts and knowledge of civilization. With incidental exceptions, the history of the Senecas previous to the American Revolution is virtually that of the League. See also Iroquois League.

Consult Parker, A. C., *Analytical Story of the Seneca Indians* (1925), and publications of the Bureau of Indian Affairs, Department of the Interior.

SENECA, town, South Carolina, in Oconee County, altitude 950.4 feet; on the Southern and Blue Ridge railways; 125 miles northeast of Atlanta, Ga. An agricultural and textile manufacturing community, its largest industrial establishment is the neighboring Utica-Mohawk Cotton Mill. Settled about 1850 and incorporated in 1874, it was named for the once important Cherokee Indian village of Seneca, four miles distant on the Seneca River. Government is by mayor and council. Pop. (1950) 3,649.

SENECA CAVERNS, underground caves, West Virginia, in Pendleton County, with interesting rock formations which attract tourists from many sections of the United States.

SENECA FALLS, village, New York, in Seneca County, altitude 465 feet; on the Seneca River and the Barge Canal; on the New York Central and the Lehigh Valley railroads; by rail, 41 miles southwest of Syracuse. The falls in the river that give the place its name furnish the power that promoted early industrial development. It is an industrial community in the midst of a region of farms and orchards. Foremost among its industries is the manufacture of pumps. Other products are machine tools, precision tools, rulers and yardsticks, auto ignition parts, women's dresses, and socks. The village has a public library and a municipal hospital. Town annals contain items of considerable general interest. The first woman's suffrage convention, held here in 1848, was called by Mrs. Amelia Jenks Bloomer and Mrs. Elizabeth Cady Stanton. It was for the former "bloomers" were named, although Mrs. Bloomer was not the inventor. Seneca Falls claims to have made the first steam fire engine and the first commercially introduced pumps. First settled in 1787 by Lawrence Van Cleef, a Revolutionary War veteran, Seneca Falls was incorporated in 1831. Its government is administered by mayor and council. The water supply system is owned by the city. Pop. (1950) 6,634.

SENECA LAKE, a lake west of the central part of New York State, about 25 miles south of Lake Ontario (q.v.), into which it discharges its waters by the Seneca and Oswego rivers. It is about 37 miles long, from north to south; and from one to four miles wide. Its depth is about 630 feet and it is 445 feet above sea-level. Geneva is situated at the northern end and Watkins Glen at the southern. At Sampson, a village on the eastern shore 12 miles south of Geneva, a naval training base was established in 1942; it was later converted into an air force base and training center. For a time after 1946 the base was used as the site of Sampson College, a state emergency college for veterans of World War II. Seneca Lake is one of the group called the "Finger Lakes."

SENECA RIVER, a river of New York; flows east from the north end of Seneca Lake to the north end of Lake Cayuga, then turns north and is joined on the left by the outlet of Lake Canandaigua, then turns east, and receives in succession the drainage of the other parallel "Finger Lakes," Owasco, Skaneateles and Onondaga, then turns northwest, taking the name of Oswego River (q.v.) and enters Lake Ontario at Oswego. Length, including the Oswego, nearly 100 miles.

SENECA, or SENEGA ROOT. See POLYGALA.

SENECIO, sē-nē′shĭ-ō, one of the largest known genera of plants, comprising about 1,000 species; it belongs to the family Asteraceae, and is universally distributed. It is, therefore, practically impossible to give a compact description of the generic characters; but it may be said that these plants are annual or perennial herbs, shrubs, or even arborescent, have basal or alternate leaves, and solitary, corymbose or paniculate heads of flowers, usually yellow in hue. These are made up of both radiate and tubular flowers, the latter being five-toothed and perfect, or of the tubular ones alone, on a flattened or slightly convex receptacle. The involucre surrounding each flower head is cylindric or campanulate, with its principal bracts in one series, distinct or slightly united at the base, and encircled very often with a ring of shorter scales. The achenes are mostly terete or compressed, sometimes curiously papillose. After wetting, these papilla put forth pairs of spiral hairs which secrete adhesive mucilage.

The generic name has been derived from the Latin *senex,* an old man, in reference to the tuft of soft bristles surmounting the achene, and mostly white. These parachutes have so well distributed the seeds of the common groundsel (*S. vulgaris*), originally European, that it is found all about the civilized temperate zone as a troublesome weed. It is a more or less glabrate annual, about a foot high, with spatulate pinnatified leaves and rayless yellowish heads in corymbs. It blooms at all seasons, and is often sold in English cities as food for cagebirds. At one time it was even regarded as a love charm, and was said to have formed a part of the Virgin's bed. It was also of old repute for poulticing. *S. aureus* is a charming, slender, American species, with cordate basal leaves, called golden ragwort, and blooming in the spring. Squaw-weeds are other species of *Senecio.*

The plants known as cinerarias, having dark-blue rays—a rare color among composites—are greatly cultivated and hybridized, but not many other senecios are valued in horticulture. Among these are the familiar German ivy (*S. mikanioides*), an easily propagated, rapidly growing, glabrous, twining vine, with small yellow flowers in auxillary or terminal clusters, and glossy, deltoid-ovate leaves; and the Cape ivy (*S. macroglossus*), a beautiful greenhouse climber with golden flowers as large as marguerites and ivy-like leaves. One of the "dusty millers" is *S. cineraria,* a tall perennial, enveloped in white wool, and with small compact corymbs of rayless flowers. The handsome *S. pulcher,* with reddish-purple rayed flowers, of strong growth and cobwebby foliage; the great *S. japonicus,* over five feet high, and extremely ornamental, with its large palmate leaves, and large yellow flowers; and *S. petasites,* valuable for its large panicles of big, yellow fragrant flowers, blooming in midwinter, are also cultivated.

SENEFELDER, zā′nĕ-fĕl-dĕr, **Aloys,** Bohemian inventor of lithography: b. Prague, Nov. 6, 1771; d. Munich, Bavaria, Feb. 26, 1834. The son of an actor, in early life he tried unsuccessfully to be both actor and dramatist. Having learned something of printing he conceived the idea of inventing a process of his own, and was finally led by accident to his great discovery of lithography (q.v.). Subsequently he made important improvements, contrived a press, procured a patent and set up an establishment, which he carried on successfully. In 1809 he was appointed inspector of the royal lithographing establishment. He published the *Elements of Lithography* (1819), a curiously illustrated work, which he translated into English and French. *Consult* Nagler, *Aloys Senefelder und der Geistliche Rath Simon Schmidt* (1832); Pfeilschmidt, E., *Aloys Senefelder* (Dresden 1877); Muller, J.,

W., *Invention of Lithography* (New York 1911).

SENEFELDER, Leopold, Austrian physician: b. Vienna, Sept. 25, 1864. He was educated at the Preparatory Seminary of Mariaschein, the Mies Gymnasium Bohemia, and the University of Vienna. In 1888–1889 he served as interne at the Garnisons-Spitale No. 1, Vienna, was physician to the reserves and assistant physician at Rudolf Hospital, Vienna in 1889–1891. He established a practice at Sankt Pölten, Lower Austria, in 1892 and at Vienna from 1893–1905. After 1908 he was lecturer on the history of medicine at the University of Vienna. In 1902 Dr. Senefelder accompanied Cardinal Gruscha to the Jubilee Celebration at Rome. He was librarian and archivist of the Vienna College of Physicians and published *Anathema esto?* (1892); *Die Katakomben bei St. Stephen* (1902); *Die kaiserliche königliche Weiberstrafenstalt* in *Wiener-Neudorf* (1903); *Dispensatorium pro pharmacopoeis Viennensibus in Austria* (1907); *Acta Facultatis medicae universitatis Vindobonensis,* vols., IV, V, VI (1908–1911). He collaborated in *Geschichte der Stadt Wien* (1904) and contributed to various periodicals.

SENEGAL, sĕn-ĕ-gôl′, West Africa, (1) a river which flows into the Atlantic near St. Louis, the capital of the French colony of Senegal, in latitude 15° 48′ north. It is formed by the union of the Hafing and the Bakhoi, at Bafulabé, the former rising in the Futa-Jallon Mountains, southwest of Timbo, and the latter near Wosebugu. From the opposite or western side of the mountain in which the Bafing rises springs also the Falémé, another great branch of the Senegal, which runs north in a more direct course until it joins the united head streams above Bakel. The Senegal is about 1,000 miles long, and is navigable up to the cataracts of Félou in Kassan, about 700 miles from its mouth. A river service from St. Louis to Kayes, 460 miles, is maintained during the flood season, and a railway line has been built from Kayes to Kulikoro on the Middle Niger, where the waters are again navigable. During the last few miles, it forms a delta marked by numerous *marigots* or channels which disperse its waters through the adjacent plains; and its mouth is dangerously barred, so as to be accessible only for small vessels in the dry season. Dredging operations are employed to facilitate navigation. (2) A French colonial possession comprised in the government general of French West Africa, named after the river Senegal. It is bounded on the west by the Atlantic, on the south by the British colony of Gambia and French Guinea, on the east by the Falémé River, which serves as a boundary between Senegal and the French Sudan, and on the north by Mauretania. The capital, St. Louis, about ten kilometers from the river mouth, was founded in 1658 by French colonists who had been trading in Senegal since 1637. The colony was captured by the English in 1758, and retaken by the French in 1779. Again seized by the English during the wars of the Consulate and Empire, it was finally restored to France in 1815. The settlements did not flourish until the appointment of Gen. L. L. C. Faidherbe (q.v.) as governor in 1854. He subdued the Berber chiefs who prevented the French advance inland and annexed their territories. Subsequent governors pursued the same policy; districts were annexed and protectorates proclaimed with extraordinary rapidity, although the two powerful chiefs Ahmadou and Samory occasioned a great deal of trouble between 1887 and 1890. During Faidherbe's administration the capital, originally badly constructed and unhealthy, was transformed. Senegal was reorganized administratively by the laws of Dec. 7, 1920 and Mar. 30, 1925.

Dakar is a fortified naval station and the seat of the governor general of French West Africa; Rufisque, Kaolack, and Ziguinchor are secondary ports. In December 1924, Dakar and its suburbs were constituted a special district under a European administrator subordinate to the governor general. In April 1929, Gorée, a small island off Dakar, was also included in the township. Local self-governing institutions have existed in the communes of St. Louis and Gorée (now Dakar district) since 1872, and in Rufisque since 1880. They are elected councils, the majority of their members being African.

The total area of Senegal is 77,600 square miles and the population is estimated (1941) at about 1,723,068. The inhabitants of St. Louis, Rufisque, Dakar and Gorée are French citizens; the other Senegalese are French subjects. The territory used to be represented in the French Parliament by one deputy, and elected (with Mauretania) two delegates to the Constituent Assembly. It is administered by a governor assisted by a privy council and by the Senegal Colonial Council composed of 44 members, 26 of whom are elected by French citizens and 18 by representatives of chiefs of cantons and provinces. The territory is divided into 12 *cercles,* each under the rule of an administrator.

A railroad, 165 miles long, connects Dakar, Rufisque, and St. Louis; another 450 miles long, extends from Thiès to Kayes and Bamako in the French Sudan. There is river service on the Senegal from St. Louis to Podor, 140 miles, and during the rainy season, from Dakar to Kayes, 484 miles.

Dakar (pop. est. 1938, 100,003) is a very important port of call on shipping and aviation routes between Europe, South America, West and South Africa. It possesses a dry dock capable of accommodating ships 630 feet long. Before World II, an average of 2,700,600 tons of goods were cleared and 4,000 vessels passed through this port. Dakar is also the site of a large airdrome and serves as a seaplane and naval base.

The greater part of Senegal is sandy and flat, with forests in the southern section along the lower reaches of the Casamance River. Peanut production is the chief source of revenue, exports amounting to between 560,000 and 600,000 tons annually, in addition to large quantities supplied for local consumption. Most of this is shipped ready shelled, but one seventh of it in the form of peanut oil. Other agricultural products of Senegal are palm oil and palm kernels supplied to local soap manufactories; corn, millet, rice, sizal, and gum.

There are large numbers of meat and draught animals in Senegal: more than 500,000 head of cattle, 600,000 sheep and goats, also hogs, donkeys, horses, and camels. Gold is mined in the central and upper valley of the Senegal and Falémé rivers. Pottery, bricks, jewelry, and

woven articles are made by Senegalese craftsmen. The territory imports cotton goods, farinaceous products, sugar, machinery, and coal.

SENEGAMBIA, a name formerly given to an extensive region in West Africa and so called from the Senegal and Gambia rivers. The area covered was variously estimated from 400,000 to 700,000 square miles, and the population 12,000,000. Senegambia included not only the colony now known as Senegal but also the coast territory as far south as Sierra Leone. Many races inhabit this territory, the principal Negro tribes being the Yolofs, Foolahs, and Mandingoes, native to the territory between the Gambia and the Senegal. The inhabitants to the north are mostly Moors, who carry on an extensive trade in gum, etc., with the Europeans.

SENEY, sē'nĭ, **George Ingraham,** American banker: b. Astoria, Long Island, N.Y., May 12, 1826; d. New York, April 7, 1893. He was educated at the Wesleyan University and at the University of the City of New York where he was graduated in 1847. He engaged in the banking business and in 1877–1884 was president of the Metropolitan Bank, New York. He lost heavily at the time of the bank's failure in 1884, but later succeeded in partially re-establishing himself financially. Before 1884 his benefactions amounted to about $2,000,000. He gave $500,000 to establish the Seney Hospital in Brooklyn and $500,000 to both the Wesleyan University and the Methodist Orphan Asylum in Brooklyn. He also gave $250,000 to Emory College and the Wesleyan Female College, Macon, Ga., and liberal sums to other public institutions. He sold his famous collection of paintings at auction in 1885, receiving $406,910 for them. From a later collection he gave 20 valuable paintings to the Metropolitan Museum of Art, New York.

SENIJEXTEE. See Salishan Indians.

SENILITY. First we must ask, when does the adult age end and old age begin; and next, when does old age lapse into senility? It is extremely difficult to make exact calculations in figures of these successive periods of human life, for individual differences play a considerable role. External appearance is far from being a sure criterion: an old head may contain the most youthful spirit; decadence does not strike all the organs at the same time; there is a kind of gradation in the progressive enfeeblement of the human economy. That part which we call purely mechanical is first to deteriorate; muscular weakness manifests itself long before the diminution of cerebral activity. From the age of 65, muscular effort may become painful, while the cerebral faculties usually retain all their power and even, more often than not, grow stronger through experience which is intelligence in reserve. There are people who are born old, as there are others who remain eternally young.

Heredity plays a great role, as does excessive work which tends to wear out the organism. The kind of life one leads—the emphasis placed on material enjoyments or on those of the mind—is likewise reflected in the organism.

Attempts have been made to determine for human beings the exact time in the life span when old age succeeds the adult age: Hippocrates declared that it began at 56 years, Louis J. M. Daubenton at 63, and Pierre J. M. Flourens (qq.v.) at 70. These figures lack any correspondence to reality, for the year of a person's life marking the commencement of old age is quite indeterminate; it differs for each individual.

Maximilien P. E. Littré in the *Dictionnaire de Médicine* has thus defined old age: "Period of human life the beginning of which has been set at the sixtieth year, but which may be more or less retarded or advanced depending upon the individual constitution, the type of life one leads, and a multitude of other circumstances." Littré was perfectly right. A person's actual age, the number of years attested by the birth certificate, is an indication which, however, does not constitute a presumption. To be sure, from the age of 65 one may well distrust a man's apparent youth; the majority of men at that age betray a marked decline of vitality. But there are frequent exceptions. During the 20 years of this writer's contest with old age, more than a thousand persons who thought themselves old, and who really were old, have sought his professional advice. Among these patients there were some men of 50 and others of 70 years. At both these age limits they stated that their skin was becoming more and more dry, that their faces were becoming covered with wrinkles, that they were losing their hair. All said that their muscular strength had markedly diminished, their digestions had slowed down. Their memories were less dependable; prolonged intellectual effort provoked a lassitude they had not experienced before; they realized a loss of moral courage, of self-confidence; they felt a general lassitude and preferred repose to activity.

The symptoms of old age are, in fact, partly objective and partly subjective, and reflect the changes produced by old age in the inmost tissue structures where the regression of functional cells and invasion of connective tissue become more and more accentuated.

From the cerebral point of view, old men, before reaching the stage of senility, show no diminution of intellectual capacity. On the contrary, experience and concentration of the mind on various subjects throughout a lifetime tend to make it more penetrating, more profound, to develop a more tolerant spirit and a surer judgment. But the memory begins to suffer lapses; prolonged intellectual effort produces a fatigue and lassitude never experienced in the adult age; the faculty of imagination becomes blunted. Arrived at senility, the most brilliant intellects founder; sensitiveness and response to emotional stimuli progressively diminish.

Disturbances of metabolism and of the distribution of nutritive substances often lead to obesity. On the other hand, in the senile state, in consequence of increasingly accentuated sclerosis of the organs, the body becomes mummified, so to speak. Among old men, the skin of the face is pale, dry, wrinkled, and the hair has turned grey or white; frequently the figure is bowed; the stature shrinks progressively by three or four centimeters between the ages of 65 and 85 years; the muscular strength weakens, the joints lose their suppleness, and the footfalls become increasingly heavy. Sleepiness, especially after eating, is usual. Vision weakens, as well as the sense of hearing. Urinary disorders are manifested in frequent urination, especially at night; inability to retain the urine may even be an added con-

dition of senility. Ordinarily blood pressure increases.

In the state of senility, one lives on for a certain time at a slower pace. When man is not killed by accident or disease, when peacefully he approaches the extreme limit of human life, he dies by inches.

Let us now consider the actual cause of old age—what inmost processes of our tissues determine it.

It would be sheer waste of time to examine all the metaphysical and more or less fanciful theories that have been published on this subject. It would seem that the only way to solve the problem, while remaining on solid scientific ground, would be to make microscopic studies of the organs of men who have died at extreme old age and compare them with those of young or adult men. Apart from the lesion, properly so called, that caused death, the lesion that, so to say, gave the *coup de grace* to the superannuated worn organism, what modifications can we ascertain in the structure of the tissues of the old man? Can we not find the key to the enigma in the fact that thousands and thousands of autopsies of very old people have invariably revealed the same histological modifications: diminution and atrophy of the specialized functional cells of every organ, and augmentation and hypertrophy of the conjunctive cells and later of the fibrous tissue? Here we have the principal fact that explains the diminution of the output of each organ and the resultant general weakening of the body. What strikes one particularly in senile organisms is that in performing an autopsy, the liver and kidneys make a sharp grating sound under the scalpel, their tissues having become sclerotic.

Indeed, the hepatic (liver) cells, which by their multiple role play so important a part in nutrition, are in large part surrounded and, as it were, suffocated by the fibrous tissue. The same phenomenon is observed in the kidney where the epithelial cells, responsible for elimination of noxious products, are similarly replaced in large part by the conjunctive cells. The walls of the ducts most often have lost their elasticity; fibrous tissue and calcareous substances, perhaps coming from the decalcification of the bones, make them hard and brittle. Degenerated cerebral cells are replaced by conjunctive cells.

The skin drys up, the muscles atrophy, grow pallid and shrunken, themselves becoming sclerotic. The connective tissue progressing into fibrous tissue likewise invades all the glands to the detriment of their functional cells, whence there results a diminution of both internal and external secretions. One needs only observe old men of 80 to 85 years to see how frequently they open and close their mouths in order to obtain a few drops of saliva with which to moisten membranes dried by sclerosis of the salivary glands. A general and constant phenomenon characterizing old age and accentuating senility may be described as follows: the number of functional cells becomes rarefied, they can no longer assure the physiological equilibrium, energy disappears, and the cellular yield falls below the minimum necessary for the maintenance of life.

If such are the causes of our old age, senility and death, it remains to be known by what mechanism the conjunctive cells enter all our organs to replace the epithelial cells.

Here is our explanation: the connective tissue forms a supporting mass for the other tissues; among the functional cells existing in all the organs, muscular fibers, and the hepatic, renal, thyroid, and other cells there are conjunctive cells which represent a kind of necessary framework for maintenance of the structure. In all the organs there are epithelial cells, *specialized* cells, responsible for accomplishing the function devolving upon the organ, while the role of the conjunctive elements is limited to supporting the structure of each organ.

Restricted to this merely passive role, besides being less fragile and worn, the conjunctive cells at any age keep their power of multiplication intact, whereas the functional cells, highly differentiated and specialized, wear out much more quickly and tend more and more to lose their power of regeneration. Thus, in each organ at a given moment there would be conjunctive cells endowed with all their reproductive energy, together with functional cells having to a great extent lost that faculty and destined to atrophy. So the balance of the two types of cells is broken.

The terrain gradually yielded by the functional cells is conquered by the conjunctive cells which have retained their power of increase intact. In proportion as the number of specialized cells diminishes, the conjunctive cells replacing them and not being able to accomplish the function of the specialized cells, the organism becomes steadily weaker. It finally succumbs when the number of functional cells falls below the minimum necessary to assure vital equilibrium. After a long and valuable collaboration, an antagonism arises between the epithelial and conjunctive cells. The conflict ends with the victory of the least perfected elements which are unqualified to assure the functioning of our organs. The consequences of this cellular conflict are seen in old age, senility and death. See also Old Age and Its Diseases.

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SENIOR, sēn'yŏr, **Nassau William,** English political economist: b. Compton, Sept. 26, 1790; d. Kensington Gore, London, June 4, 1864. He was graduated from Eton and from Oxford, and in 1819 was called to the bar at Lincoln's Inn. He was the first professor of political economy at Oxford 1825–1830; was appointed a master in chancery in 1836 and resumed his chair at Oxford in 1847. Of his writings, which comprise a number of excellent treatises on political economy, mention may be made of *An Outline of the Science of Political Economy* (1836); *Political Economy* (1850); *Essays on Fiction* (1864); and *Historical and Philosophical Essays* 2 vols. (1865). Books edited after his death are: *Journals, Conversations and Essays Relating to Ireland* (1868); and *Conversations and Journals in Egypt and Malta* (1882).

SENLAC, sĕn'lăk, or **HASTINGS, Battle of,** the one battle in the Norman conquest of England. It was fought Oct. 14, 1066 at Senlac Hill, a few miles from Hastings, between William, Duke of Normandy, and Harold II (q.v.), king of England. Harold's fortified position was attacked at 9 A.M. by the Norman army in three divisions, strong in cavalry and archers, the center led by William in person. The English made a stout resistance with their battle-

axes and other weapons, but part of them pursuing William's flying Bretons, the whole body was led into a trap by the feigned retreat of many of the Norman forces, the disordered ranks of the English being easily overborne by their enemies, who stormed and carried the hill. The death of Harold, who was pierced in the eye by an arrow about sunset, disheartened his men and they shortly dispersed. Battle Abbey was erected by William on the field where Harold fell and portions of it still exist. Among the literary treatments of the event are two poems of Chatterton and a drama by Cumberland. Consult Green, 'The Conquest of England' (1899); Freeman, 'Norman Conquest' (Vol. III, 1876). See WILLIAM I.

SENN, Nicholas, American surgeon: b. Buchs, Switzerland, 31 Oct. 1844; d. Chicago, Ill., 2 Jan. 1908. He was brought to this country when a boy and settled in Wisconsin. He was educated at the Chicago Medical College and the University of Munich, was house physician at the Cook County Hospital 1868–69 and practised medicine in Wisconsin 1869–93, being at one time surgeon-general of that State. After 1893 he practised in Chicago, where he was attending surgeon of the Presbyterian Hospital and surgeon-in-chief of the Saint Joseph's Hospital. He was appointed in 1898 chief surgeon of the Sixth army corps, ranking as lieutenant-colonel of volunteers and chief of staff in the field. From 1884–90 he was professor of surgery at the College of Physicians and Surgeons, Chicago, and after 1890 professor of practical and clinical surgery at the Rush Medical College. He was also professor of surgery at the Chicago Polyclinic and lecturer on military surgery at Chicago University. Among his works are 'Four Months Among the Surgeons of Europe'; 'Experimental Surgery' (1889); 'Surgical Bacteriology' (1889); 'Principles of Surgery'; 'Tuberculosis of Bones and Joints'; 'Medico-Surgical Aspects of the Spanish-American War'; and a 'Nurse's Guide for the Operating Room' (1903).

SENNA, Nelson Coelho de, Brazilian lawyer and author: b. Serro, Minas Geraes, 11 Oct. 1876. He was educated at the Normal School at Diamantina, Historical Institute at Rio de Janeiro, São Paulo, Nichtheroy and Ceará, and the Academy of Juridical Sciences, Ouro Preto. He has been successively secretary of the police and agriculture departments of his native state, professor of Brazilian and history at Mineiro Gymnasium, Bello Horizonte, and vice-president of the council of public instruction of Minas Geraes. He served in the first, second and third Latin-American scientific congresses. He is member of many learned societies both of South America and of Europe. His published works are 'Questões internacionães do Brazil'; 'A Edade da Pedra do Brazil'; 'Elogio literario de José Eloy Ottoni, poeta sacro brasiliero'; 'A Hulha Branca'; 'Los Indios del Brazil'; 'Contes Sertanejos'; 'Paginas de historia religiosa do Brazil'; 'Discursos Academicos'; 'A Bacia do Rio Dôce,' etc. He edited *Annuario Historico e Estatistico do Estado de Minas Geraes* after 1906.

SENNA, a nauseous, bitter but valuable purgative drug, obtained from the leaves of several tropical species of the leguminous genus *Cassia* (q.v.). The officinal species are shrubby plants, with nearly regular, five-parted flowers in racemes and alternate, pinnate leaves subdivided into many leaflets. Alexandrian senna is formed of the leaflets of *Cassia acutifolia,* which are dried by cutting the shrubs until the leaflets shrivel and tumble off. *C. angustifolia* grows in and about Arabia, where it was used in domestic practice by the Arabs, who were apparently the first to introduce the drug to Europe. It is called Indian senna, as it is cultivated in South India. Bombay senna is a very inferior quality of this variety, much mixed with stalks and dead leaves; the variety Tinnevelly, on the contrary, is the largest and cleanest senna in commerce. *C. obovata,* formerly of good repute, producing senna-pods and cultivated in India, is now classed among the inferior qualities and rarely met with except as an adulterant. Still other sennas are known under the name of the port of export, or place of growth. American or wild senna is the *Cassia marylandica,* a perennial abundant in the southern United States, sometimes eight feet high, with obtuse, oblong leaflets, numerous yellow flowers, with clawed petals and long linear pods. It has the qualities of Oriental senna in a lesser degree and was formerly used for the same purposes in popular medicine. Bladder senna is the *Colutea arborescens* and is also a purgative sometimes called bastard senna.

SENNAAR, sä-när', Anglo-Egyptian Sudan, a province extending between the Blue and the White Nile, from Khartum to Fazogl. The Arabs call it the «Island of Sennaar.» Generally speaking, it is a broad plain with occasional granite mountain heights and is at the north steppes thickly overgrown by wild grass and bushes; the southeast has tall forests intersected by fertile valleys. Gold and iron occur, and palms, tamarinds, etc., grow on the plain. Monkeys, lions, gazelles, giraffes, elephants, besides marsh and water-birds, are numerous; also domestic animals. The chief occupation is fishing. The products are rice, grain, melons, tobacco, sugar, senna, ebony and sandal-wood. The climate is exceedingly warm and during the rainy season is unhealthful. The inhabitants are negroes — the Funj, Nubian and Galla, and of mixed races. Sennaar, which was the former capital, stands on the Bahrel-Azrik or Blue Nile. A great irrigation dam across the Blue Nile was completed in 1926. The other towns are Fazogl, Roséres, Wod-Medineh and Khartum. Near the latter town are the extensive ruins of Soda, the ancient capital of the Funj, a negro race who migrated there from Central Africa in 1500 and founded the Sennaar kingdom, which lasted until 1821.

SENNACHERIB, sĕ-năk'ĕ-rĭb, an Assyrian king, son of Sargon, succeeded his father on the throne 705 B.C. Among his first acts as king was the suppression of the revolt of Babylonia and after accomplishing this he directed his arms against the Aramean tribes on the Tigris and Euphrates, of whom he took 200,000 captive. He then reduced a portion of Media, till then independent; placed under tribute Tyre, Aradus and other Phœnician cities; advanced against Philistia, made war upon Egypt and finally marched against Hezekiah, king of Judah, who had revolted. Hezekiah, terrified, yielded in a panic, and paid the tribute exacted, namely, 300 talents of silver and 30 talents of

gold. On his return to Assyria Sennacherib made another attack on Babylonia and afterward reinvaded Judah. Having marched through Palestine he laid siege to Libnah and Lachish and finding that his messengers Tartan, Rabsaris and Rabshakeh had failed in obtaining the submissio.. of Hezekiah, he wrote an intimidating letter to Hezekiah; but before he could bring his forces against the city, according to the Bible record, a visitation from the Lord during the night caused the death of 185,000 of his troops. In consequence of this calamity Sennacherib returned to Nineveh and troubled Judah no more. From Herodotus we learn of the Egyptian tradition regarding the destruction of Sennacherib's host, which is, that a multitude of field mice devoured all the quivers and bowstrings of the enemy and gnawed the thongs by which they bound on their shields. No mention of the destruction of his host is found in the monuments of Sennacherib. This ruler was one of the greatest of the Assyrian kings and was not only a great warrior but also a great builder. His largest architectural work was the palace of Koyunjik, which covered an area of fully eight acres. Of the death of Sennacherib all that is known is contained in the brief Scripture statement of 2 Kings xix, 37 and Isa. xxxvii, 38, from which it appears he was murdered by his own sons. See Assyria; Assyriology; Babylonia.

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SENORA AMA, drama in three acts by Jacinto Benavente, was acted at Madrid 22 Feb. 1908. The story is one of peasant life on the plains of High Castile, a presentation of contemporary rural Spain as brilliant in color, but sordid and dead within, palsied with the degeneracy of a decaying civilization, from which all impetus and inspiration have disappeared, and merely husks of Church and State remain. Few dramas are of equal pessimistic power. As a veracious psychologic study, the play is of great value, depicting the sterility of the retarded country-side which is sunk in jealousies, sensuality and greed, where only the maternal instinct breathes unstunted amid the insentient fields. The minutest details are of unimpeachable realistic veracity. The author avoids any semblance of generalization. Yet in the absence of physical descriptions, the aspect of the Castilian plain and sierra is projected from the austere mentality of the peasantry with a rudeness of coloring and distinctness of outline which the Spanish painters have not surpassed. The sense of the motionless background provided by centuries of Spanish civilization is conveyed with the same economy of means. Upon the technical side the play is one for the artist. In illuminative insight and potency of imaginative suggestion, although a work of pure realism, it rivals in completeness the universality of idealistic art. There is the customary lack of *coups de théâtre,* reinforced by a contemptuous disregard of the conventional conceptions of the stage. The first edition appeared at Madrid, 1908. Consult also Benavente, 'Teatro' (Vol. XVII, Madrid 1909). The English translation is included in the third series of the 'Plays by Jacinto Benavente' (New York 1917 et seq.).

John Garrett Underhill.

SENS, France, archiepiscopal city and capital of an arrondissement in the department of Yonne, situated on the right bank of the Yonne River, 70 miles southeast of Paris. The city contains the cathedral of Saint Etienne dating from the 12th century and a fine city hall, which contains also a museum of precious stones, a library and an art gallery. Manufactures consist chiefly of fertilizers, farm implements, leather, glue, serge, etc., and there is considerable trade in wine, corn, hemp and flax. Sens was known in ancient times as Agenticum and later as Senones and was one of the largest cities of Gaul, vestiges of the old Roman walls still being visible. Pop. about 15,000.

SENSATION. This term is used broadly to designate any form of consciousness which originates immediately from the stimulation of the sensory end-organs of the nervous system (e.g., the eye or ear). This usage fails, however, to distinguish between sensation and sense perception. In the narrower psychological meaning sensation applies to the elementary forms of consciousness originating under the conditions mentioned. Sensations are in this technical sense cognizant of simple sensuous data, such as colors, tones, etc., whereas perceptions are cognizant of objects. For example, we perceive a sunset, a complex visual object displaying various color qualities, e.g., whiteness, redness, etc., of which we become conscious as sensations. These sensations are regarded as simple and incapable of further analysis. We perceive a musical sound when a note is struck upon the piano. This sound is made up of a simple fundamental tone and its overtones. Our consciousness of one of these simple pure tones is a sensation. On these terms sensation is evidently largely an abstraction of the psychologist. Our actual sensory consciousness is commonly cognizant of objects, i.e., is perceptual.

Certain authors extend the meaning of sensation so as to include not only all elementary sense qualities arising directly from sensory stimuli, but also all such qualities when aroused in processes of imagination, as when, for instance, one closes the eyes and gets a visual image of a rose. They speak, therefore, of peripherally and centrally originated sensations. In so far as this usage calls attention to the fact that the sensory and ideational elements are qualitatively alike, whether called out by central or peripheral stimulation, it is justifiable. But well-established custom is violated by the procedure and it may be questioned whether it will endure.

The commonly recognized groups of sensations are as follows: color, including brightness, sound, taste, smell, pressure, heat, cold,

pain, articular, tendinous, muscular, thirst, hunger, sex, circulatory (including tickling, itching, etc.), respiratory and static (dizziness sensations from the semi-circular canals of the ear).

Psychologists are wont to treat sensation under four principal aspects, i.e., quality, duration, intensity and extensity. Of these four quality is generally considered most basal. A sensation of tone, for example, may vary in duration without appreciable alteration of the pitch, which constitutes its most essential quality. Again, a color sensation may under certain conditions vary in extent without noticeable variation of quality. But a sensation which had no duration or no intensity would obviously be no sensation at all, and in general, if any aspect which a given sensation can manifest be reduced to zero, the whole sensation vanishes. Certain psychologists maintain that every sensation possesses all these aspects, but probably the majority hold that auditory sensations at least, and perhaps a few others, like smell, are lacking in extensity. Certain interesting facts concerning the relations of sensation intensities to one another are formulated in Weber's and Fechner's laws. (See WEBER'S LAW). According to Weber equal differences in sensation intensity are produced by relatively equal differences in stimulus intensity. If we place a weight of 20 grams upon the hand, we shall notice no change until we have added another whole gram, i.e., of the original stimulus. If we take a weight of 100 grams, we must now add not one gram but $\frac{1}{20}$ of 100 grams or 5 grams, before we notice a change. The same sort of relation holds for a number of the senses within the medium ranges of intensity.

Sensations depend upon the stimulation of specific end-organs connected with specific brain centres. No one ever gets visual experiences who does not possess an optical centre in the cerebral cortex and who has not at some time possessed a functioning retina. No one ever gets auditory experience without a similar use of the ear and the auditory cortex and the same sort of thing is true for each of the sensations.

The stimuli which produce sensation are classified as adequate and inadequate, internal and external, mechanical and chemical. The only pair which requires any explanation is the first. Each sense organ is fitted to respond primarily to some special form of physical stimulus, e.g., the eye to light, the ear to sound, etc. Such stimuli are called adequate. In addition to these adequate stimuli, however, the senses can be aroused by other forms of stimulation designated inadequate. Thus an electric current conducted to the frontal region of the head may produce sensations of light. Pressure on the eyeballs similarly occasions color sensations. It may be added that sensations often continue after the stimulus is removed. Such sensations are known as after-sensations. In the case of vision they present very remarkable characteristics and are commonly called after-images.

Sensations combined in various ways and reinstated in the form of memory and imagination furnish the basis of all our ideas. They are accordingly the foundations upon which rests the whole structure of knowledge. To understand their function in this particular it must be borne in mind that in actual experience they are not mere naked qualities, but that they serve to convey meanings and that it is in this manner that they achieve fundamental import for mental life.

Bibliography.— James, 'Principles of Psychology' (New York 1890); Külpe, 'Outlines of Psychology' (1895); Bain, 'Senses and Intellect' (London 1855). For special senses see literature of special articles, VISION; SENSATION, ORGANIC, etc.

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SENSATION, Organic. The term organic sensation is nowadays applied broadly to all those sensations which originate from internal bodily stimulations. They are called forth by mechanical, chemical and thermal changes in the organism. Among the sensations which are commonly held to belong to this group may be mentioned pain, pressure and temperature from the interior of the organism; sensations from the muscles, tendons and joints; sensations from the alimentary canal; sensations from the circulatory, respiratory and sexual organs; and finally sensations which are supposed to originate from the semi-circular canals of the internal ear. These sensations are sometimes distinguished from the other forms of sensation like vision and hearing on the ground that they convey to us primarily a knowledge of the state of our own organism rather than knowledge about the external world. This distinction is, however, only roughly accurate.

The sensation qualities which originate from these senses can be described only with approximate accuracy, for psychological analysis has not succeeded as yet in unraveling all their complexities. Pain, pressure and temperature are familiar experiences requiring no description. From the muscles we obtain sensations which suggest dull pressure, becoming under conditions of fatigue somewhat unpleasant and in condition of cramp leading to distinct pain. From the tendons we obtain sensations which inform us of the movement of our limbs and particularly sensations of strain and resistance. It is generally held that from the joints we receive important sensations which also inform us of the movements of our limbs and in particular make us aware of their position. Certain authorities have called in question — both on anatomical and psychological grounds — the significance of the articular sensations. These sensations from muscles, tendons and joints commonly occur together and are sometimes spoken of in a group as the «muscle sense» or the kinæsthetic senses. Experimental devices are necessary in order to isolate them from one another. The circulatory processes are probably responsible for such subjective sensations as feverishness, shivering, «pins and needles,» itching, tingling and tickling. Of course certain of these sensations are at times called forth by direct external causes. The heart itself occasionally gives rise to very distinct sensations, commonly of a painful character. The respiratory organs are probably responsible for our feelings of suffocation, of «stuffiness» and closeness as well as for those of freshness and stimulation in the air. The alimentary canal occasions at least three specific qualities: hunger, thirst and nausea. Undoubtedly the processes of secretion and excretion affect the general tone of consciousness from time to time,

although, with the exception of the sexual organs, it is difficult to say whether they produce any real sensations apart from those already mentioned. The respiratory, circulatory, alimentary and sexual sensations are sometimes spoken of as the «vital sensations.»

The semi-circular canals together with the vestibular portion of the internal ear are commonly regarded as responsible for our impressions of the movement of the body as a whole; but it seems certain that under ordinary conditions other senses contribute to these impressions and only in the case of dizziness is it at all clear that the sensations themselves are different from those hitherto mentioned. It is in any case reasonably certain that these organs constitute part of a reflex system by means of which the body equilibrium is maintained.

The term common sensation, or sometimes common feeling, has been applied more or less indefinitely to this whole organic group of sensations with special reference to the fact that our general feelings of vigor, health, discomfort, depression and so on depend upon them. When these terms are used at present they are more commonly applied to sensations like pressure and pain, which are conceived as widely distributed over the body and therefore as more or less common to the impressions gained from various sense organs.

Organic sensations are undoubtedly dependent like other sensations on the stimulations of sensory end-organs connected with centripetal neural pathways leading to the brain. These end-organs instead of being placed upon the surface of the body, like those of the more familiar senses, are imbedded in the various deep-lying tissues of the organism. A marked peculiarity of many of these sensations is their tendency to set up massive, widespread irradiating effects often quite remote from the seat of stimulation. This is probably brought about by means of the intimate connections of many of these organic sensory nerves with the sympathetic nervous system. This is less true of the kinæsthetic sensations and certain forms of pressure than of the remaining members of the group. Pain affords many striking instances.

The organic sensations play an extremely important part in the phenomena of feeling and emotion. In such emotions, for example, as fear and anger it is clear that a large part of the content of our feeling is made up by sensations of this character, e.g., sensations of tingling or flushing which come from circulatory changes in the skin, painful sensations from the region of the heart, sensations of choking which come from the respiratory passages, sensations of trembling which come from the motor mechanisms, and so on. The James-Lange theory of emotion makes the reflex stimulation of these organic sensations the cardinal fact in emotion whereby it is distinguished from other forms of consciousness.

These sensations are also held to possess distinct significance for the processes of memory and recognition. It is thus maintained by certain authorities that the characteristic psychological process when we recognize a familiar object is found in the arousal of certain of these organic sensations which are called forth by familiar objects, whereas a different set of organic qualities is aroused by unfamiliar objects. It seems fairly certain in any event that the process of recognition is characterized by the presence of a definite mood and the specific qualities of our various moods are by general consent of psychologists determined by the presence of definite organic sensations.

Ribot and others urge furthermore the existence of «affective memory.» By this they mean that in addition to our ability to recall ideas and in addition to our ability to remember whether any given past experience was agreeable or disagreeable, we possess the capacity actually to reinstate in some measure the original affective coloring of a past experience. This is brought about, they maintain, either by our capacity freshly to arouse the organic sensations which originally belonged to the experience, or by our ability to arouse the images or mental copies of these sensations. Certain psychologists deny the existence of these images. Without attempting a discussion of the merits of this doctrine it is safe to say that individuals vary vastly in the degree to which they actually possess this capacity of fresh arousal of either the organic images or sensations characterizing a former experience.

Aside from the particulars already mentioned organic sensations possess small value for the cognitive side of mental life. They bring us relatively little exact knowledge and in conditions of health come only infrequently to clear consciousness. On the other hand they are ordinarily marked with distinct feeling-tone, are definitely agreeable or disagreeable. Under conditions of health they seem to afford the basis of our feeling of well-being, a feeling which is sometimes vivid but usually dim and vague. They are very disagreeable and painful when the bodily processes are overtaxed or disturbed in any way and it is in connection with such experiences that we most often find them coming distinctly into the foreground of the mind. The discomfort of indigestion, extreme fatigue and headache will illustrate the point.

Although their value for our knowledge processes is small, their significance for the life of impulse and volition is tremendous. The two great impulses represented by hunger and sex may suffice to illustrate this side of the subject. All our processes of will and the whole substructure of character are honeycombed with influences which originate in these impulses, and the impulses themselves are but the motor expressions of stimulations from organic sensations.

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SENSATIONALISM, *in philosophy* the doctrine that our ideas originate solely in sensation and consist of sensations transformed Locke has been classed with Condillac and other philosophers of the 18th century as holding the doctrine of sensationalism; but Locke teaches that «all human thoughts, even the most complex and abstract, are due to experience»: they are all made up of «simple

ideas,» and are due to phenomena of which we are percipient in the five senses, or else they are due to reflection on «the operations of the mind.» Condillac most distinctly refers all ideas to sensation. He supposes a statue organized within like a man, but as yet without sensibility. He endows this statue with one sense after another till it becomes perfectly a human being, and holds that it then would possess exactly the same ideas as ourselves, though in its first state it had no ideas.

SENSE-ORGANS. See ANATOMY, COMPARATIVE.

SENSES, in psycho-physics, anatomy, physiological-psychology and in philosophy, specialized nervous apparatus and the psychological process by the stimulation of which (or its equivalent) qualitatively distinct sensations are produced. Sense is equivalent to the Latin word «sensus,»* the Italian «senso,» the French «sens,» and the German «sinn.» A sensation — for to understand the import of «sense» it is necessary that one should understand «sensation» also — is that process of nervous or quasi-nervous irritation which can only be accounted for by the present operation of a stimulus or its equivalent upon a sentient being. It is the feeling that takes place while a sense-impression is made. A sense-impression is the effect of an event upon sentiency. What is that sense-perceived something, an event in which affects sentiency? It must be answered that it is designated by what is really one of the vaguest concepts in the whole realm of thought, an abstract notion, the idea of matter. For present purposes we shall define matter as anything which can affect the senses. Upon which motion we may build up one conception of «sentiency,» and define it as the «matter perceiving,» as an American philosopher, Dr. Paul Carus, defined it.

The use of «sense» as equivalent to «consciousness,» as in the phrases «time-sense,» «sense of responsibility,» and in ‹sense of the heart› (the so-called *occult sense* of the mystic, Jonathan Edwards, who claimed by it one might know spiritual worth, truth, etc., by a kind of intuition), is confusing and inaccurate. (Consult Baldwin, ‹Dictionary›). States of consciousness are nothing but the states of awareness or feelings connected with not only sensation, but also with perceptions, ideas and volitions. These states constitute the entire «subject.» Memory and imagination are at times defined as senses — internal senses; but this distinction is psychologically of no particular importance. Sensation (in German «Empfindung,» in French «sensation,» and in Italian «sensazione»), is a word confined by definition to those sense-impressions fully realized in consciousness, and this definition excludes the cerebral process of image-reproduction, etc., which is normally aroused in the absence of stimulation. It is at all times a very great advantage in thinking to recall that the terms «sense,» «sensation,» and even «matter» are, after all, at best concepts arrived at through a process of abstraction. For even so great a psycho-physicist as Ernst Mach (to cite one example) used «sensation» as synonymous with «reality» itself. Man generalizes, he marks and describes those features which a set of events has in common; but while generalizations are symbolized by mere words they deal with the events which are aglow with life or action. «Sense,» «sensation» and «matter» are such mental symbols, and they represent not the whole of reality, but at most only a single set of its features respectively.

Organism developed from protoplasm whose potentialities are four in number; and an organism whose histologic units are four would seem to have also four psychic facultative manifestations. Irritability, contractibility, metabolism and reproduction in the cell correspond to epithelium, muscle, connective tissue and nervous tissue in higher animal forms. In the mind they become sense, will, understanding and ideation. Epithelium has its analogon in «sense,» and ideation, its parallel in «tissue formation,» or «reproduction.»

Professor Ernst Haeckel in one truly profound lecture, beautifully explains how each animal cell, and even each plant cell, is endowed with a peculiar kind of «soul-life» of its own. In higher animal forms, he tells us, there are formed through division of work special «soul-cells» of «nervous-substance.» The lower we descend in the animal series the more the nervous system is simplified, and more, too, the nervous elements separate from each other, until finally they disappear merged in the mass of an undifferentiated organism. It is the same with all the other apparatus, with all the anatomical elements; and it would be as absurd to refuse sentiency to an animal because it has no brain, as to declare it incapable of nourishing itself because it has no stomach. Sentiency itself originates through contact and interaction of matter with matter. And the truth is that the nervous system arises like other systems from division of labor. Lower creatures are sentient, the higher brute animals conscious, but self-consciousness is found only in man who alone is aware that he knows.

To Demosthenes, the eloquent orator of classic antiquity, is ascribed the statement that all the senses are modifications of the sense of touch. Sentiency is always an awareness of objects in external material existence. So too is it with the senses. Kant distinguishes two sources of knowledge — sensation and pure reason. Sensations are incidental and particular; come to us singly in a haphazard way and without affording any information concerning a necessary connection. The character of pure reason alone is the intrinsic necessity and universality of its statements. The sequence in which the specialized apparatus of each sense appeared in the evolutionary process is unknown. Touch, taste, sight, hearing and smell are at times said to represent that sequence. The senses originated through irritation received at the periphery of

* One may recall that the Latin names of the five senses, with the word " sensus " itself, are all of the fourth declension in that tongue, and are thus nouns having one form only to express both numbers. Awkward as is any form of these Latin words in English, students have come to it, and speak of " sensuses," and even of " visuses," " sensus," " visus," " auditus," " gustus," "olfactus," and " tactus," whether employed as Latin or as English words, are, however, all nouns which reveal number only in the accidence of words with which they are grammatically connected. See the protest of H. H. Wilder, " Desmognathus Huscus [sic] ", in *Science* (19 April 1918, New York); and the Reply to Professor Wilder by T. L. Casey in the same journal (21 June 1918).

an organism. Taste is most nighly differentiated in man. Sight is perhaps keenest in birds and bees. Hearing is the strongest faculty of the hare. Smell is the peculiar faculty of the blood-hound and of the ant. Touch attains a high degree of perfection in the trunk of the elephant. The bee is sometimes said to possess a peculiar faculty, an «hygrometric sense,» as it is named. This quality or power of the bee is attributed to the little animal owing to an inference based on its undeniable power to «detect» and avoid a coming storm. It is just possible, however, that the bee employs sight rather than an hygrometric sense to detect the approach of storms, and to avoid them.

Through experience, a nerve, the optic nerve, became adapted to waves of ether. There irritations are transferred to the optic ganglions, and there possibly the disturbance is accompanied by the awareness called light. So also a nerve, the auditory nerve, became adapted to air waves. The irritations effected by these waves are transferred to the auditory ganglion, where possibly the disturbance is accompanied by the feeling known as sound. All other nervous cells of specialized sense, whether olfactory (or of smell), gustatory (of taste), or tactile (of touch), arose in evolution and function in a way similar to the senses of sight and hearing. Along the whole line of nervous fibres, from the point where sense-impressions enter to the place where muscular contraction such as usually follows the transmission of a shock from sensory to motor nerves, there is, physiologically, one uninterrupted chain of nerve motion. Yet the feeling or consciousness which accompanies a sensation is no motion.

One does not exhaust the number of sensations, however, if indeed one does the number of the specialized senses, in any mere enumeration of the sense-organs. These latter are the eyes, ears, nose, tongue and skin. In addition to the sensations of vision, hearing, smelling, tasting and touching (all of which Aristotle enumerated long ago), are to be mentioned, if only for greater completeness, pressure, temperature, pleasure, pain, muscular sensations, sensations in the ears, and sensation from the inner contents of the body. Pain and pleasure (see IRRADIATION), muscle sense, sensations from the semi-circular canals and vestibules of the ear, hunger, thirst, sexual-sense, fatigue, and sensations from the visceral organs — are internal, or organic sensations. Suffocation, internal warmth and chilliness are others of the same class. In all one perceives the characters of ordinary sensation, the sense-process or psychic function involved in the apprehension of anything by the senses.

As belonging to the outer world one speaks of sensations and their complexes arising in our own body as organic sensations, because we locate them in our own body. Examples are sensation of fatigue of our muscles, and the pressure and pain sensation of our inner organs. The relatively uniform elements of touch and organic sensations are distributed among sensations of pressure, warmth, cold and pain. In contradistinction to these, the special senses of hearing, seeing, smelling and tasting present an abundance of sensations, each of which according to its peculiar constitution is called a quality of sensation. Each such quality is variable in its intensity. Qualities of sensations all refer to the objective world. Our own body, to which touch and organic sensations relate, forms in contradistinction to our consciousness (the subjective reality, our real selves) a part of the outer world;— nearest to us indeed, but still a mere part of the objective or external world. Subjective existence is constituted of those feelings or states of consciousness whose activity is no motion. Objective existence is represented by things whose activities are motions. Man has abstracted from a group of sense-perceptions an idea of his «body.» The group of facts so collectively designated as «body,» the action of which appears in constant connection with and as a condition of our consciousness, is kept in health only through constant renewal of its waste products out of the resources of the objective world, of which it is a part.

Sensations, while they are psycho-physical processes normally due to actual stimulation, can occur without any stimulation being present. Delirium and the manifold examples of what are wrongly called sense-illusions are cases in point. Audition colarée, which seems to associate sound with color, is an example of excessive associative power, a result of insufficient balance of associative capacity, whereby the less near is approached because of the loss of what commonly should have been associated. When an adult professes to perceive a color, for example, every time he hears a letter of the alphabet named, it is hypothetically safe to say that were an investigation undertaken, it might disclose that the colors which such an adult professes to «hear» are the very colors in which the letters were printed on the blocks from which as a child such an adult learned his letters. There is no recorded instance worthy of credit of what has been styled «sense-transference,» either concerning people in the somnambulistic state (as has been claimed) or out of it. No person ever read, tasted, heard by the fingers, or the stomach or any parts of the body other than through those organs by which reading, tasting, hearing, as functions of the sense organs, are naturally performed. Those «higher» phenomena of clairvoyance prevision, retrovision, introvision and telepathy do not (in the ordinary sense of these words) exist at all. Mysticism of this sort colors the thought of only those people who in regard to some matters «spiritual» have strong convictions based on no evidence. The recollection of a sensation is nearly the same (but not the same) as an original sensation. For were it a sensation with a present stimulus then one might actually freeze to death through frigid imagination. Such recollection resembles the original sensation only (as being like it) a psychic event. By means of our senses we secure mental impressions through certain organs,— sensory or sense-organs,— concerning the world of objects, including impressions concerning changes in the condition of our bodies: and nothing more. There is a telepathy, or «far-feeling,» however, which does not stand in miraculous contradiction to the mechanical interconnection of cause and effect in the external world. In and through our eyes most distant stars are seen. Only in this sense has telepathy any claim to recognition by scientific psychology. Yet the feeling feature of sensations is

purely subjective. Things are mirrored in our eyes; sounds are heard with our ears; and abstract notions are formed mentally to represent them. It would of course be very absurd to expect that the things represented in a sensuous-manifold should migrate bodily into our heads; and yet it would be equally as absurd as some far feeling telepathists profess to believe, that things or objects in the external world could be felt without the normal use of the sensory organs.

Though no animal has specialized more senses than five, many are much more sparingly endowed. Of very great importance as regards our enjoyments and our sufferings all knowledge besides has its roots in sensation. «All our knowledge,» observed Gassendi long ago to Descartes, «appears plainly to derive its origin from the senses, and though you deny the maxim 'Quicquid est in intellectu processe debere in sensu,' yet this maxim appears nevertheless to be true; since our knowledge is all ultimately obtained by an influx or incussion from things external; which knowledge afterward undergoes various modifications by means of analogy, comparison, division, amplification, extenuation and other similar processes which it is unnecessary to enumerate.» (Gassendi, in 'Objectiones in Meditationem Secundam').

Hallucination is a misinterpretation of sensations. The feelings are real enough in such cases; but the representations concerning what are supposed to evoke these feelings are not valid. Sensations become precepts, many precepts of one kind become concepts. From these concepts by the help of the reason abstractions are drawn. Thus all the objects of our surroundings are mirrored in their relation toward us and among themselves in the living substance of the brain.

Bergson attributes to intuition a peculiar power. (Consult 'Creative Evolution,' English trans. 1913). That there is something unique and new at every moment may be granted. Further, that it is also true that this cannot be fully expressed by means of intellectual concepts may be also granted. Only direct knowledge can acquaint us with what is unique and new. But direct acquaintance of this kind is given fully in sensation and does not (as Bergson contends) require any special mystical faculty of intuition, for its apprehension. It is neither intellect nor intuition (in the Bergsonian sense), but sensation that supplies new data. Bergson makes much of evolution. It must be pointed out that it is only through the intellect that evolution can be known. If the intellect is misleading the whole of man's biological ancestry which we know through the intellect is presumably an erroneous inference. Bergson's advocacy of intuition as against intellect is thus a self-stultification.

Kant distinguishes two sources of knowledge — sensation and pure reason. Yet the ultimate data of experience and the bases of all knowledge are sensations. These data of experience are the several states of consciousness, the elements of which are the sensory impressions, which fully realized in consciousness are sensations. Experimenting with the purely formal is indeed a kind of experience, and may be distinguished as inner experience, just because it is not merely a subjective process, but ideal. Objectively and scientifically the external objects of one's sensations are those sensations measured in terms of what we suppose to be their causes. We no longer feel, owing to long practice of projection, our sensations as states of consciousness, but conceive of an independent reality as given immediately. But sensation is nevertheless only the psychical feature of the data of experience, and in the idea of a sensation, the material and physical stimulus is excluded. All one's sensations are in one's self, not in their cause. We are conscious primarily of our self-sensing and of our feelings; and not with the objective world. What man knows of his environment is all pure deduction from his own conscious states, particularly deductions from the feelings attending sensations. All these deductions serve no other purpose than that of the explanation of these sensations in terms of what we affirm to be their causes. Into that side of human consciousness in which reasoned reflection has no part, the vast contexture of material existence finds entrance in terms of sound, color, taste, cold, heat, resistance, weight, hardness, shape, situation and motion. Whatever one can know of one's environment results when recourse has been taken by one to causation, a concept yielded by pure reason, which causality having been projected into the external world, renders an explanation of sensations possible. Boyle long ago observed that whenever one speaks of experience correcting reason, one speaks improperly; for, he observes, it is reason itself that corrects reason with information supplied by experience. Here it should be noted that man knows many natural phenomena not directly observable through the senses; for example, the chemical constitution of the stars.

The psychological characters of sensation considered without reference to the conditions of its production are hearing, vision, smelling, tasting and touching. All these (we infer) are the effects of external causes or facts. They are so many subjective methods of representing certain processes of the objective world.

Even sensations are a kind of abstractions. By abstractions are meant a singling out, and isolating, a separation of sense impressions, so that they can be held for thought. Our eyes, for example, abstracts certain ether vibrations called light and transforms them into vision. The ears abstract only certain air vibrations and we transform them into sounds. The muscular sense abstracts resistance and we transform this into an idea of corporeality. The skin abstracts temperatures yielding elements for our notions of heat and cold. So is it with all other sensations. They abstract certain features of reality, or facts, and impress us.

There is a firmly rooted muscular sense of rest, uneasiness and of exertion. Various muscular efforts occurring in the head and face have become associated with definite emotions. The labial nasal, and ocular external coverings are muscles of expression. Certainly the vocal muscles give the same kind of an expression, not visible but audible. (Consult T. H. Evans, on 'Some Curious Psychosensory Relationships').

There are no such things as illusions of sense. What is illusory is only an inference to which the feeling elements give rise in sensation. The sensation and its feeling are real psychic events; and it is indeed only by some

reality not merely sensible that even dreams can be condemned. What is illusory is manifest only in misinterpretation of certain experiences.

Vision, hearing, taste, smell and touch depend upon certain stimulations from without;—mechanical (touch), molecular (taste and smell), physical (sight and hearing), and muscular (muscular sensation). At times the required stimulation may be effected within the nervous system. The cerebral processes by which vision (for example) is produced may not only be started in the brain itself, but when so started may result in those identical interpretations which normally accompany the process when set at work by stimuli from the external world.

According to Romanes there is a constant ratio between the amount of agitation produced in a sensory nerve and the intensity of the corresponding sensation. Weber states that if sensations are to increase in intensity by equal amounts the stimulus must increase by relatively equal amounts. His law is that the perceptible increment of sensation is proportional to the quantity of irritation. More precisely: In most cases the quantity of sensation is proportional to the logarithm of the quantity of irritation. Further researches in this direction were undertaken by Fechner, Volkman and Appel; and to their works the students of the subject may be recommended. It is entirely true that we do not experience sensation in the sense-organs. We feel the state of our nerves. The brain itself is the seat of all sensation.

Taste, smell, sight and hearing are operative because of special organs connected by special nerves with the brain. As to touch, while there are special organs, it is an unsettled question whether tactile sensations are conveyed by special nerves or by the ordinary sensory nerves of the skin. The organs of sense depend upon the alertness of the brain for efficiency. It is in fact the brain that sees, hears, etc. As sight, hearing and touch seem to be most concerned with the wants of the intellect, they are sometimes spoken of as the intellectual senses; while taste and smell, being intimately connected with nutrition, are known as the corporeal senses.

Cultivation of the senses, especially if begun in early life, will develop their usefulness. It produces the accurate hearing of the musician, the keen eyesight of the pilot, engineer and expert microscopist, and the accurate touch of the blind. But training may be carried to such an extent as to make these senses sources of misery. Certain persons are painfully conscious of the slightest discord; others almost instantaneously detect, with a feeling of disgust, the inharmonious blending of tints which, to the average person, are all in harmony; still others are made uncomfortable by an odor perceptible to no one but themselves. All the senses become accustomed to continued impressions, so that they no longer perceive their existence. This condition may prove a source of danger, for one may, for example, become habituated to harmful odors. Sense-education of the feeble-minded, as accomplished by Seguin and his wife, by "constant, assiduous, philosophical training," is a noteworthy achievement. It seems to be a rule, with but few exceptions, that when one sense is lost or seriously impaired nature sharpens some other.

Touch, or tactile sensibility, enables us to appreciate by actual contact, the size, form and consistency of objects and the character of their surface. It is most sensitive in the margin of the lips, tip of the tongue, palms of the hands, and under surfaces of the fingers. Some writers speak of «general sensibility» as one of the senses, and include under this term, touch, muscular sense or the sense of pressure, sense of temperature, etc. The organs of touch are end-bulbs and tactile corpuscles. See Muscle-Sensation.

Taste enables us to discover and recognize flavors. This sense resides in the tongue, soft palate, uvula, pillars of the fauces, tonsils and the upper part of the pharynx. The organs of taste are taste-bulbs and various papillæ. The nerves of taste are the gustatory branch of the fifth pair of cranial nerves and the lingual branch of the glosso-pharyngeal nerve. Only those substances can be tasted which are dissolved, and at the same time the mucous membrane of the mouth must be moist.

It is said that the German physiologist Valentin could detect a 100,000th solution of quinine. What we know of the different tastes are complex experiences made up of odors, motor experiences, pressure and pain sensations, visual elements and a far more limited number of taste elements than we suppose. Their number seems to be four: sweet, salt, sour, bitter. Of the physical stimuli of taste sensations we know even less than of the indefinite localized physiological organs of taste. Chemically different substances may even arouse the same sensational response; for example, both sugar and acetate of lead yield a «sweet» taste. Only one statement may be hazarded; namely, that the taste stimulus is always in a liquid form. Taste sensations and their brain area (little known) all involve attention, discrimination, judgment, and so on. The tongue tastes. It also feels. Aerated water is «felt»; alum «draws» the tongue.

The most satisfactory classification of smells as we meet them in nature is that adopted from Linnæus by the Dutch physiologist, Zwaardemaker. It recognizes the following classes: (a) Etheral smells, including all fruit odors; (b) aromatic smells, like those of camphor, spices, lemon, rose; (c) fragrant smells, like those of flowers; (d) ambrosiac smells, like those of musk; (e) alliaceous smells, like those of garlic, assafœtida or fish; (f) empyreumatic smells, like those of tobacco and toast; (g) virulent smells, like that of opium; (h) nauseating smells, like that from decaying animal matter.

Many smells are of course like tastes obviously complex experiences containing elements of taste, touch and vision as well as sensations of smell. The «pungency» of such smells as that of ammonia is a «touch» quality. Smell stimulus is gaseous, not liquid, and the property of stimulating the end-organs of smell is a function of the physical molecule, not of the atom, since most of the chemical elements are odorless.

Smell is the sense by which odors are perceived. The olfactory nerve is, like the optic nerve, a prolongation of the cerebrum. The olfactory bulb is at the anterior extremity of the

olfactory nerve (more strictly the olfactory tract), of which it is an enlargement, and the development of the bulb bears direct relation to the acuteness of smell. In some animals, in which smell is very acute, the bulb is of such size that it is called the olfactory lobe. In man the impressions of this sense often need to be confirmed through other senses. Odors, to be recognized, must be presented in a gaseous or vaporous form. Dryness of the mucous membrane of the nose and excessive secretion blunt the sense of smell. Some persons are so susceptible to odors and emanations that the smell of certain substances, as of roses, new-mown hay, etc., or of certain powdered drugs, may excite in them an inflammation of the nasal passages. Hay fever (q.v.) is one form of such inflammation. There is an intimate relation between smell and taste. Delicate flavors are not appreciated when the nose is obstructed, as by catarrh, etc., or in cases of anosmia (q.v.), loss of the sense of smell. Smell influences the respiratory process, and the breathing of a fine odor increases the amplitude of the respiratory movements. The sense of smell may be highly developed, especially where there is deficiency in other senses. By it certain blind and deaf persons are able to recognize anyone with whom they have previously come in contact. This delicate sense is impaired by oversecretion of the nasal mucous membrane (catarrh), by its dryness or its frequent irritation, and may be destroyed by disease or injury.

Sight is the faculty whereby we receive impression of light, movement, form, size, shades of color, and the manifold beauties of nature and art. The organ of sight is the eye, the nerve of sight, the optic nerve. Necessary also to proper vision are the eyebrow, eyelid, eyelashes, lachrymal and Meibomian glands, tear-passages, and certain muscles. Clear vision depends on the focusing rays of light through clear media upon the retina, and the conveyance of impressions so brought to the cerebrum by means of the optic nerves. Defects in vision are color-blindness, myopia, presbyopia, hypermetropia, astigmatism, etc.

Hearing is a sense whose organ is divided into three parts, external, middle and internal. The latter is essential, the others are accessory. Hearing is effected by means of impressions made by the vibrations of elastic bodies (ordinarily the atmosphere). Impressions of sound-waves are conveyed through the complex apparatus of hearing to the auditory nerves, and through them to the brain. Any interference with the delicate mechanism of the auditory apparatus, as by inflammation or injuries, blunts the sense of hearing. See ANATOMY, COMPARATIVE; NOSE; NOSE AND THROAT; SALIVARY GLANDS.

SENSITIVE PLANT, or **HUMBLE PLANT,** an herb (*Mimosa pudica*) of the family *Mimosaceæ*, a native of tropical America. It is an erect spiny or hairy plant with long-petioled pinnate leaves and numerous purplish flowers in roundish heads, followed by spiny, jointed pods. It is naturalized in many warm countries, and is cultivated as a curiosity in greenhouses and as a summer annual in gardens. The seeds are sown in early spring in any good garden soil and given ordinary care. The plants are chiefly interesting because of the movements of the leaves when touched. If only lightly touched the leaflets close in pairs, but if more roughly the petioles become depressed. Young foliage responds more quickly, the movement usually occurring within one second after contact. In a few minutes the leaves gradually resume their former expanded position, the time required depending upon the age of the foliage, the warmth of the atmosphere, etc. At night the plants "go to sleep," that is, the leaves become depressed as after contact. Other species of *Mimosa*, especially *M. sensitiva*, a semi-climber, are also somewhat sensitive to touch.

SENSORY AREA, a portion of the brain in which the terminals of the sensory nerve-filaments finally end, constituting the cerebral centres of sensation. The location of the general sensory area is by no means definitely known. There are a number of sensory areas: thus the area for the sensations of sound is located in the superior temporal convolutions of the brain, and destruction of this area does not prevent the patient from hearing save when both auditory centres are destroyed, but does prevent him from the intellectual appreciation of what is heard. The sensory area for sight is located in the occipital region; for smell in the brain-base. The general feeling sense-area, however, the so-called sensory centre in the brain, is thought to lie below the motor area, somewhat overlapping it. It will probably be many years before the exact limits of the various areas in which the different sensory axones terminate are known. When that time does come, however, the student of the diseases of the mind will be in a much better position to understand the different variations in personality as shown in diseases of certain areas. Consult Flechsig, 'Gehirn und Seele'; Barker, 'The Nervous System.'

SENTENCE, a combination of words so arranged as to express a complete thought. A sentence is, therefore, the unit of thought expression and as such it determines the construction of words in accordance with their relationship to one another and to the sentence itself. Sentences have been classified in various ways. According to grammatical form, they are simple, compound and complex; agreeable to rhetorical construction they are classed as periodic, loose and balanced. A simple sentence contains but one subject and one predicate, and sometimes one or the other of these two essential parts may not be expressed; but in this case it is necessary that it should be understood. The suppression of the subject pronoun is very common in some languages, notably Spanish. A compound sentence contains two or more principal clauses; example, "The way was long; the wind was cold; the minstrel was infirm and old." A complex sentence must contain but one principal clause and one or more subordinate clauses: "The stag at eve had drunk his fill where danced the moon on Mona's Rill." A periodic sentence is so constructed as to hold the thought in suspense until its close: "Having come to the town early in the morning and having wandered about it all day, it was only in the evening that he went to pay the expected visit to his friend." A loose sentence, on the contrary, may be terminated in two or more places, each termination making complete

sense: «In the evening he paid the expected visit to his friend (after having come to the place early in the morning) and wandered about it all day.» A balanced sentence consists of two parts similar in so far as their form is concerned, but frequently expressing a contrast: «She was an ornament to the society in which she moved; he was a disgrace to the mother who bore him.» Sentences are also classified, according to their use, into declarative, interrogative, imperative and exclamatory. Most sentences are declarative, because a declarative sentence asserts something as a fact. «This road is long,» «This road is not long,» «This road may be long.» These are declarative sentences because each affirms something. One affirms something that is positive, another affirms something that is negative, while the third affirms a doubt or a possibility of doubt in the mind of the speaker. An interrogative sentence, as its name implies, asks a question; an imperative sentence gives a command; and an exclamatory sentence makes a statement under the influence of strong feeling (hence in the form of an exclamation).

Parts of a Sentence.—A sentence may contain subject, predicate, complement, object and various modifiers. In general, in English, the subject and object must be expressed in an imperative sentence, when the pronoun subject is generally suppressed. The complement is used to express the completion of a verbal idea which the verb does not, of itself, complete: «This boy is already a *Man*.» The sentence may have the same kinds of modifiers as the individual words. A subject or object, being a noun or the equivalent thereof, takes adjective modifiers; a verb admits adverbial modifiers; while a noun phrase may serve as the subject or object of a sentence, and as such may take an adjective modifier. Appositional nouns or noun phrases may also be used to modify, through the fact of their apposition, other nouns or noun phrases. Sentences are also sometimes classified as balanced or non-balanced. A balanced sentence has the words and phrases of one part so arranged that they correspond in position and form to those of another part: «Wherever a few great minds have made a stand against violence and fraud, there has been her spirit in the midst of them, inspiring, encouraging, consoling; by the lonely lamp of Erasmus; in the restless bed of Pascal; on the tribune of Mirabeau.» A sentence should have clearness, force and unity. Of these three qualities unity is absolutely necessary for a perfect sentence. In other words a sentence should be a unit in substance and expression. (See RHETORIC). Consult Bloomfield, L., 'Introduction to the Study of Language' (New York 1914); Bosanquet, 'Logic' (London 1911); Tanner, W. M., 'Composition and Rhetoric' (N. Y. 1925); Foerster and Steadman, 'Sentences and Thinking'; Stratton and Woods, 'Good English' (1926).

SENTENCE, *in law,* is a judgment pronounced by the court or judge on a criminal, being the final determination of the court through a judicial decision, publicly and officially declared in a criminal prosecution. It is not the discretionary act of the court, but the judgment of the law, which it is the ministerial duty of the court to pronounce.

SENTIMENTAL JOURNEY, A. 'A Sentimental Journey Through France and Italy,' by the Rev. Laurence Sterne (1713–68), was the result of a seven months' trip that the author took for his health in 1765–66. On his return he completed 'Tristram Shandy' and, though delayed by serious illness, had written two books of 'A Sentimental Journey' by December 1767. These were published on 29 Feb. 1768, and added greatly to the reputation acquired through the former novel. Sterne's death, on March 18, left the book unfinished. What we have is a small volume usually regarded as one of the most original and choice books in English literature, though not of the highest quality. In France its reputation has been even greater than in England.

The book is essentially a more detailed and expanded form of the idea of the seventh volume of 'Tristram Shandy,' written while Sterne was in France in 1762–63, with his wife and daughter. Some of the characters and episodes are the same, as that of the mad girl Maria, but the book is composed from a more definite and special point of view; it was «designed to aid us to love the world and our fellow creatures better than we do.»

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SENTIMENTAL TOMMY, a novel by J. M. Barrie, published in 1896. It details the life and development of a young writer and is taken to contain considerable autobiographic material. Its sequel is 'Tommy and Grizel' (1900).

SENUSSI, or **SENUSSITES,** an Arab sect or order, founded by Mohammed Ion Ali el Senussi (1791–1851). Influenced by Wahabism, the strict or orthodox sect of Arabian Mohammedism, he organized in 1837 a brotherhood for the purification and simplification of the Faith. Under his influence and that of his son, Sidi el Mahdi, the order spread rapidly, having its strength chiefly in Tripoli and other regions of northern Africa. This secret and aristocratic order had by 1910 over 100 centres and a large and aggressive membership. Sidi el Mahdi died in 1902, and was succeeded by his son, Sidi Ahmed el Sherif. The Senussi aided Turkey in the Italo-Turkish War for the possession of Tripoli in 1911, and at the outbreak of the World War, under German and Turkish influence, they took the side of the Central Powers. Late in 1915 Sidi led a large force of Senussi and Bedouins against Egypt. This attack was repulsed in December, but only after hard fighting by English and South African forces. Other attempts were also checked, and the Senussi suffered a severe defeat at Barrani in January 1916. Later in the same year Great Britain and Italy arranged for a more effective government of the disturbed area, and there were no further serious disturbances. After the war the Senussi acknowledged the sovereignty of Italy over Tripoli. See WAR, EUROPEAN–TURKISH CAMPAIGN.

SEOUL, SÖUL, KEIJO-FU or **HANYANG,** Korea, the capital of the country, on the river Han, about 70 miles by water from its mouth in the Yellow Sea, and 25 miles by rail from Chemulpo, its seaport. The city

proper is a short distance from the river, in a basin partly surrounded by heights, and enclosed by a wall. The former royal palace is the chief edifice, and with its grounds occupies over 500 acres enclosed by a lofty wall. Seoul is the seat of various foreign embassies; a Roman Catholic cathedral and a Confucian temple are other noteworthy buildings. Silk, paper, tobacco, mats, fans and similar commodities are the principal products of native industry. There are schools for the teaching of Japanese, French, Chinese, Korean, Russian and English, and an American Mission School, which is subsidized. Three Korean and two Japanese daily newspapers are published in Seoul, which is connected with all the ports of Korea and with the outer world by telegraph. Under Japanese rule considerable advance has been made. Electric lighting and electric street railways have been introduced, and there is railway communication with Chemulpo, Wiju and Fusan. Pop. 404,202, including 113,321 Japanese.

SEPARATE ESTATE. See HUSBAND AND WIFE.

SEPARATIST SOCIETY OF ZOAR. See ZOAR, SEPARATIST SOCIETY OF.

SEPARATION. See HUSBAND AND WIFE.

SEPARATISTS, in Church history, (1) Those who in the reign of Queen Mary of England refused to conform to the public services of the Roman Catholic Church. Among them was Mr. Rose, who was apprehended with 30 of his congregation while celebrating the Lord's Supper in Bow-church Yard, London. Another well-known Separatist was Mr. Rough of Islington, who with several others was burned at the stake by order of Bishop Bonner. (2) In Ireland the Separatists were numerous, consisting chiefly of the Walkerites, founded by the Rev. John Walker, who seceded from the Established Church of Ireland and founded a small church in Dublin, with the doctrines of the Sandemanians as their creed. Other Irish Separatists were Rev. Mr. Kelly and his adherents who left the Established Church and formed an individual and independent Sandemanian communion. The Darbyites of Ireland were Separatistic Millenarians from whom sprang the Plymouth Brethren. (3) The German Separatists seceded from the Lutheran Church in the 18th century and founded a Pietist sect in Würtemberg. Persecution drove them to emigration and they settled under George Rapp (q.v.) in Pennsylvania, where they founded the Harmony Society, calling themselves Rappists. Those who remained in Germany established themselves at Kornthal, under the name of Kornthalites. All who in Germany refused to conform to the German Evangelical Union, founded by Frederick William III of Prussia, were also known as Separatists. (4) The name was taken by some of the early Puritans such as the Traskites (q.v.). They were subsequently represented by the Quakers. Among the most important sects which have assumed this name are the Separatists of Zoar, a village of Tuscarawas County, Ohio. Their constitution is strictly communistic; they refuse to serve as soldiers; consider celibacy a higher life than marriage; reject all religious ceremonies, while maintaining the cardinal doctrines of Christianity. In 1898 it was decided to distribute all the property among the members, then numbering about 225, and this abolished the communistic features of the society. The municipal incorporation of the Society of Zoar, however, remained intact, and the community still continues to exist, but without many of its distinguishing characteristics.

SEPIA. See CUTTLEFISH.

SEPIOLITE, a compact, clay-like mineral of smooth feel, hardness 2 to 2.5, specific gravity 2. Owing to its porous nature it floats on water when dry. Color white or slightly tinted gray, yellow, red, or green. It is a hydrous silicate of magnesium, $H_4Mg_2Si_3O_{10}$. Extensive beds in Spain are utilized as a building stone. The mineral from Morocco is used in Algeria as a substitute for soap. It occurs as a secondary mineral derived from magnesite in the plains of Asia Minor, in alluvial deposits. The mineral from these deposits, popularly known as "Meerschaum" (q.v.), is used in the manufacture of tobacco pipes.

SEPOYS, sē'poiz, or sẹ-poiz', the name given in India to the forces composed of natives, disciplined after the European manner. The French were the first to see that the transportation of troops from Europe to their Indian colonies would be too expensive and that Europeans would perish in great numbers by the exposure at sea and in the climate of India. They therefore took Hindus into pay and the English adopted the same policy. In 1937 the total strength of the native army in India was 159,200, and that of the European was 57,045 The Sepoys are hardy and capable of enduring much, and very temperate in their food.

SEPPUKU. See JAPAN—*The Samurai-Bushiclo.*

SEPT-FOIL, an ornament or figure which has seven leaves or lobes; a church ornament composed of seven equal segments of a circle used to symbolize the number of the sacraments, gifts of the Holy Ghost, etc.

SEPTEMBER, the ninth month of the modern year, but the seventh of the old Roman year, which began in March. It has always contained 30 days. See CALENDAR.

SEPTEMBRISTS, in French history, the name given to the agents in the massacre which took place in Paris on 2 and 3 Sept. 1792, during the French Revolution. The numbers that perished in this massacre have been variously given; but the term has become proverbial throughout Europe for all that is bloodthirsty and malignant in human nature.

SEPTENNATE ACT, The. In the German Parliamentary elections of 1887 the struggle centred around the septennate, or seven-year army period. On 14 January the emperor dissolved the Reichstag and ordered new elections to take place. The government had proposed the addition of 40,000 men to the standing army, and sanctioned the maintenance of the present military force for another septennate. No previous army grant had been for more than two years. Prince Bismarck favored the measure. The emperor said, "The septennate means peace. Reject it and there will be war." But the delegates voted the supplies for three years only, and the chancellor, by a decree from the throne, dissolved the house. The government secured a majority

in the general election, Feb. 1, 1887, and on March 11, the new Reichstag passed the septennate bill.

SEPTUAGESIMA SUNDAY the third Sunday before Lent, so called from its being about 70 days before Easter (*septuagesimus* 70th).

SEPTUAGINT, sĕp'tû-à-jĭnt, the oldest Greek version of the Old Testament. It is also called the Alexandrine version, or the Version of the Seventy, or, simply, the LXX (=70). The legend of its origin, as given in the *Epistle of Aristeas* (c.100 B.C.), is that Ptolemy II Philadelphus, king of Egypt (285–246 B.C.), requested the Jewish high priest in Jerusalem to send 70 (or 72, i.e., 6 from each of the 12 tribes) scholars to Alexandria to translate the sacred Hebrew law into Greek. Their task was accomplished with miraculous speed and was miraculously accurate.

The historical facts underlying the legend are probably as follows: The version was made in Alexandria, beginning in the reign of Ptolemy II, for the use of the large numbers of Alexandrian Jews who were no longer familiar with Hebrew. The first portion to be translated was the Pentateuch; the Prophets followed, and eventually the Writings (i.e., all the rest). The latest parts were probably translated in the 1st century B.C. Certain books not found in the Palestinian or Hebrew canon, such as the Wisdom of Solomon, were added (the so-called Apocrypha), perhaps as late as the beginning of the Christian era.

The varieties of style show that there must have been several translators, though how many it is impossible to ascertain. The language of the LXX is the Hellenistic Greek of Alexandria, based upon the Attic dialect. The most accurate work of translation is found in the Pentateuch, and next to it the Proverbs. The translation of the Psalms and the Prophets is paraphrastic; Jeremiah is well done, but Daniel is so bad that editors usually give the text of Theodotion (fl. 185 A.D.) in its place. It is thought that the Hebrew upon which the LXX was based was written in square characters, unpointed (i.e., without vowels), without separation of words, and with many abbreviations. It once was supposed that the disagreements between the Greek and Hebrew texts could be explained by assuming that the LXX translated the Samaritan Pentateuch. But this is most unlikely; a more probable theory is that the ancient Hebrew text differed somewhat from the later (Masoretic) and that the Greek text itself was changed slightly by copyists during the period prior to our oldest manuscripts.

The LXX is the original of most of the ancient versions of the Old Testament. Even where (as in the case of the Syriac) the translation was made directly from the Hebrew, the LXX has influenced the later form of the text, sometimes producing later revisions or recensions of it. It was the Bible of the earliest Greek-speaking church, to which the Greek New Testament was added; thus it has remained the standard text of the Greek Orthodox Church ever since. Of 350 direct Old Testament quotations in the New Testament, scarcely 50 disagree materially with the LXX. Though used by Philo (25 B.C.?–?45 A.D.) and Josephus (37?–100 A.D.) and probably by Greek-speaking Jews in general for two centuries or more, it was abandoned by the Jews after it had been adopted by the Christians and had received a Christian interpretation. In its place far more literal translations were provided, but even these soon were abandoned; to this day the synagogue services use the Hebrew Old Testament.

As Origen (185?–?254 A.D.), whose *Hexapla* is the first critical edition of the Alexandrian Greek Bible, was the first to see, the Septuagint is of very great value to the textual critic, as it testifies to the state of the text many centuries prior to the standard Hebrew of the medieval manuscripts. (This text has not altered very greatly, as the Dead Sea scrolls of Isaiah found in 1947 seem to show.) Even the mistakes of the LXX are useful, as showing what Hebrew words were misunderstood.

The leading manuscripts are the *Codex Vaticanus* in Rome, *Codex Alexandrinus* and *Codex Sinaiticus* in the British Museum, and the Washington and Chester Beatty fragments.

The chief modern editions are: the smaller Cambridge one, edited by H. B. Swete in three volumes (3d-4th ed., 1907–1912); the larger Cambridge, edited by A. E. Brooke, N. McLean, and H. St. J. Thackeray, of which nine parts have appeared (1906–1950); and the two-volume Stuttgart, edited by Alfred Rahlfs (1935).

E. Hatch and H. A. Redpath have compiled a complete *Concordance to the Septuagint* (Oxford 1897).

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SEPULCHRAL ARCHITECTURE, a form of art whose purpose is to give beauty or magnificence to tombs or to buildings used only for purposes of sepulture. No particular style of architecture belongs strictly to sepulchral structures. Some styles, it may be said, lend themselves more readily than others, at least for splendor of effect. Such for instance is the Gothic, in which style many beautiful specimens exist, particularly in the cathedrals and abbeys of England. In this style is the sepulchral church of Brou at Bourg-en-Bresse. A distinction is here to be noted between the practice of ancient and mediaeval times. In the case of the former the tomb was a building, large or small, apart from structures devoted to the uses of religious worship. The pyramids of Egypt were the most imposing of all human structures; the mausoleum at Halicarnassus, one of the wonders of the ancient world. The buildings erected in memory of the Mohammedan rulers in northern India as well as the Taj Mahal are to be taken with the foregoing as not strictly tombs, but as belonging to the domain of sepulchral architecture. Of all the Aryan peoples the Romans were conspicuous for their imposing tombs, specimens of which exist in the remains of the tomb of Caecilia Metella and the Mole of Hadrian, now called the castle of St. Angelo at Rome. Belonging to the period of the Renaissance are the tombs of the Medici, erected by Michelangelo, though of these the sculptural features are more important than the architectural. One of the most perfect specimens of this period is the tomb

of Loys de Brézé, erected by his wife Diane de Poitiers in the cathedral of Rouen, and attributed to Jean Goujon and Jean Cousin. In America the most notable specimen is the tomb of General Grant, a structure resembling in general form the tomb of Caecilia Metella. See also BURYING-PLACES; MONUMENTS; SCULPTURE; TOMB.

SEQUESTRATION, sē-kwĕs-trā′shŭn, *in law,* the act of taking possession of property by legal authority, as to satisfy creditors, for the use of the state, etc.; also, an equitable writ, directed to a sheriff or a number of commissioners ordering them to enter upon the estate of the defendant and to take the rents, issues and profits and to keep or pay out the same as the court shall direct. It is also used by chancery courts to force compliance with their decrees or orders.

SEQUIN, sē′kwĭn, an Italian and Turkish gold coin. It was first struck at Venice about the end of the 13th century, and afterward in all the other Italian cities, and from the Levant was introduced into Turkey. The Tuscan sequin is worth $2.30, the Turkish from $1.10 to $1.75.

SEQUOIA, sē-kwoi′ȧ, a genus of Coniferae, included in the subfamily Taxodioidae, of which the other genus is the *Taxodium* or deciduous cypress. The Sequoia genus (named in honor of the Cherokee chief Sequo-yah, who invented the alphabet of that tribe), was for a time known as *Taxodium* or *Wellingtonia;* it comprised two species, *S. sempervirens,* the redwood, and *S. gigantea,* the "big-tree," both natives of California. The genus was once widely distributed, as fossil remains testify, and the petrified forest in Arizona is stated to be composed of species of sequoia. The flowers of the sequoias are monoecious and are borne in scaly inflorescences as terminal or axillary shoots in such great profusion, that the pollen covers the ground beneath the trees during their winter blooming. The pistillate flowers mature into a fruit, or oval cone, having persistent woody scales, broadened at their outside ends into a rhomboidal flat top, very much wrinkled, and with a slightly prickle-tipped apex. Their scales are slightly separated to allow the many brown, compressed seeds to escape and then spin away on their lateral wings. The leaves are acute, compressed and keeled, decurrent on the stem, alternate and inserted in spirals, very scale-like on the branchlets, but on older branches linear and spreading.

The redwood, which was the first *Sequoia* discovered, is the more common species, and grows along the Pacific Coast just so far inland as the sea-fogs can go. It is a very straight, handsome tree, with columnar trunk, and spreading branches and branchlets, and reaches in some instances as great a height as the other and more famous species.

Sequoia gigantea, the "big-tree of California," is more rare. It is found in seventy-odd groves, forming an uninterrupted "belt" extending for 250 miles on the western slope of the Sierra Nevada Mountains, and nowhere else in the world. It grows at elevations of 3,500 to 8,400 feet. This has suggested that possible lower growths were destroyed by glacial action. The Calaveras grove near the northern extremity of this series is the most picturesque and important group of big trees, and was first discovered by J. Bidwell in 1841. These famous trees are the most massive of any in the world, but are not the tallest, being surpassed by the Eucalyptus trees of Australia. They are practically exempt from disease, and, if they were not injured by fire and by man, would have apparently an almost endless life. Some of them are judged, by the number of annual rings, to have been thousands of years old. Fully grown trees average a height of 275 feet, and a diameter of 25 feet. One of the most gigantic, cut down, with great difficulty, in 1853, was 302 feet in height, 96 feet in circumference, and after the bark was removed (which was itself nearly 18 inches thick, the diameter of the solid wood in the stump was 25 feet, 6 feet from the ground. This stump was used as a dancing floor, holding 40 or more persons. Others have been estimated as between 350 and 400 feet high. A section of one of these great trees has been placed in the Museum of Natural History in New York, and another in South Kensington, England.

The younger sequoias are very graceful, and charming in their dark blue-green foliage, being often grown in English and European parks. They have a straight, tapering stem from which the branches spring to form a narrow spire-like pyramid. After a few hundred years they begin to lose their branches, and become dome-like. Ultimately they become our picturesque trees, with a great trunk enlarged at the base, and strongly buttressed, fluted with low broad ridges, and covered with cinnamon brown bark (purple-tinted in the shadow) which follows the contour of the lobed trunk, and is deeply, longitudinally furrowed, and separated into fibrous scales on the ridges. This tapering shaft is naked for 100 or more feet, when great branches, eccentric in development, join in constructing the narrow, but massive domes which stand out above the other tall trees of the Sierras, and break into delicate but dense spray of much divided pendulous branchlets, blue-green when young but developing a bronzy tint when mature.

The big trees, while standing, have served as shelter for men and cattle, and are a constant attraction for tourists, the largest being known by name. One, the Wawona, in the Mariposa grove, has a portal cut through its base, which allows the passage of vehicles. The oldest tree whose age has been determined with some accuracy, having been felled for lumber, lived for 3,148 years, according to W. L. Jepson, the botanist. But fossil remains of other sequoia species, found elsewhere in the United States, Manchuria, Australia, Greenland and Europe, prove that the genus flourished as far back as the Tertiary and even in the Cretaceous period.

Although thousands of the big trees have been destroyed by lumbermen, many fine groves are preserved in the Sequoia, General Grant, and Yosemite national parks. See also REDWOOD OF CALIFORNIA.

SEQUOIA NATIONAL PARK, a national park in middle eastern California, established in 1890. Its chief purpose is the protection of the great sequoia trees, of which there are several hundred, all over ten feet in diameter. Situated about 55 miles east-southeast of Fresno, it has an area of 601.7 square miles. Giant Forest is the best known of its 35 sequoia groves. On its eastern boundary is Mount Whitney (14,495 feet).

SEQUOYA, sē-kwoi'à, or **SEQUOYAH,** sē-kwō'yà, Cherokee Indian scholar: b. Taskigi, Tenn., about 1770; d. near San Fernandino, Northern Mexico, August 1843. At maturity he assumed the name of George Guess, an American trader whom he believed to be his father. He was a silversmith among the Cherokees in Georgia, where, between 1809 and 1821 he invented a system by which, employing 85 characters, every sound in the Cherokee language could be reduced to writing. This syllabary, which was approved by the Cherokee general council in 1821, enabled thousands of tribesmen to read and write. It was adopted by the missionaries, and was used in printing the *Cherokee Phoenix and Indian Advocate,* a weekly newspaper first published in 1828. The success of his system induced him in 1823 to carry the new learning to the western tribes in Arkansas. His name was perpetuated in the tree Sequoia and in Sequoia National Park (qq.v.). Consult Sweetser, Kate D., *The Book of Indian Braves* (1913).

SERAC, a term applied to the ridges or ice pinnacles between closely spaced glacial crevasses. See Glacier.

SERAFIN, sā'rä-fēn', **Tullio,** Italian operatic conductor: b. Rottanova di Cavarzere, Venice, Dec. 8, 1878. He graduated at the Milan Conservatory, and made his debut as conductor with *Aïda,* in Ferrara. In 1909 he succeeded Arturo Toscanini (q.v.) as conductor of La Scala Opera House, Milan. He conducted at the Metropolitan Opera House, New York City, in 1924, and he also made frequent appearances as guest-conductor in Paris, London, Rome, and Buenos Aires.

SERAGLIO, sĕ-räl'yō, Istanbul, Turkey, the former imperial palace of the Osmanli sultans, occupying the extreme eastern part of the city proper, at the entrance of the Bosporus. It stands on the site of ancient Byzantium and is of great historic interest. The existing buildings date from the time of Mahmoud II, and chiefly occupy the summit of a hill, which is surrounded by fine gardens, the whole being enclosed by ruinous walls, partly of mediaeval origin. The entrance is on the west, near the Museum of Holy Wisdom, by the Imperial Gate (*Babi Humayum,* the "Sublime Porte"), which leads into a court lined by the mint, the old church of Saint Irene (later an armory, with many interesting objects), and a museum of antiquities (also of some interest). Another gate, the *Orta Kapousi,* leads from this court into an inner one, which is surrounded by arcades and the former kitchens of the sultan, his wives, and officials. The main part of the seraglio is then reached through the *Babi Saadet,* or Gate of Felicity, formerly guarded by eunuchs. Here is the Hall of the Divan, where ambassadors were formerly received, councils held, and justice administered; the treasury, with beautiful and valuable collections; and the harem, where the sultan's wives were housed. There are also mosques and other buildings within the enclosure. From the time of Mahmoud II, this palace was not regularly occupied by the sultans, and it therefore lost much of its former magnificence and interest. The word seraglio in Western parlance has come to denote a harem, or place for the seculsion of concubines.

SERAING, sē-răn', Belgium, a town in the province of Liège, three miles southwest of the city of that name, on the Meuse river. The castle, formerly the residence of the prince-bishops of Liège, was converted into the headquarters of one of Europe's largest ironworks in 1816. Coal is mined in the neighborhood, and glass is manufactured. The town's resources proved of considerable value to the German invaders during World Wars I and II. Pop. 42,981.

SERAJEVO. See Sarajevo.

SERAMPORE, sĕr-ŭm-pōr', or **SRIRAMPUR,** India, in Bengal, a town on the Hoogly River, 12 miles north of Calcutta, and opposite Barrackpur. It has a school, church, college and library, connected with the Baptist Mission. The principal industry is the manufacture of paper and mats. The town under the name of Frederiksnagar, belonged to Denmark from 1755 until 1845, when it was purchased by the (British) East India Company. Early in the 19th century it was the scene of Baptist missionary activities, and contains the graves of William Ward (q.v.), William Carey (q.v.) and others associated with the work. The town is attractive, and a summer resort for citizens of Calcutta. Pop. 55,339.

SERAO, sā-rä'ô, **Matilda,** Italian novelist: b. Patras, Greece, 1856; d. Naples, July 25, 1927. She was the daughter of an Italian political exile and a Greek mother. She became a schoolmistress at Naples, and her struggles with poverty during this period are related in the introduction to *Leggende Napolitaine* (1881). At the same time she assisted her father in editing his newspaper, and contributed short stories of Neapolitan life to *Il Piccolo* and other local publications. She first attracted attention by *Novelle,* a short story, followed by her first popular novel *Fantasia* (1883). From 1880 to 1886 she lived in Rome interested in literary work with Gabriele D'Annunzio (q.v.), Eduardo Scarfoglio and others, and published *Cuore Inferno* (1881); *Fiordi Passione* (1883); *Piccole Anime* (1883); *La Virtù de Checchina* (1884); *and La Conquista di Roma* (1885). She married Scarfoglio in 1885 and with him founded the short-lived *Il Corriere di Roma;* later returning to Naples, she edited *Il Corriere di Napoli* and subsequently founded *Il Mattino* and *Il Giornio,* which attained large circulations. She actively continued her book production. *Ventre di Napoli* appeared (1885); *Paese di Cuccagna* (1891); *Addio Amore; All 'Erta Sentinella; Castigo; La Ballerina; Suor Giovanna della Croce; Paese di Gesu,* between 1892 and 1902; *Storia di due anime* (1904); *Dopo il perdono* (1906); *I capelli di Sasone; Sterminator Vesevo* (1910); *Desire of Life* (1922); *Ella non Rispose* (1914); *Diario Femminile di Guerra* (1916); *Mors Tua* (1926). Many of her works were translated into English. Her early work was distinguished for the vigor of its realism, acute sensibility, and accurate observation; these traits were developed with clearer insight and deeper psychological analysis in her later works. See La Ballerina; Paese di Cuccagna.

SERAPEUM, the designation of Egyptian temples dedicated to the god Serapis. The Serapeum at Memphis was the most famous. It

was the cemetery of the Apis, and close to the Apeum, where the bull dwelt while in life. Within its precincts also were the dwellings of the priests, and a hospital for the sick, who flocked here to be cured by the dreams vouchsafed them by the god.

SERAPHIM, a plural Hebrew noun which occurs only in one passage of the Bible, Isaiah 6: 2-6, where it denoted certain heavenly creatures of human form but having each six wings, with one pair of which they covered the face, with another pair the feet, and with the third pair did fly. Their station was above the throne of the Most High, and one cried to another, "Holy, holy, holy is the Lord of hosts." The prophet was in terror, conscious of his unworthiness and that he was a "man of unclean lips." Thereupon one of the seraphim, taking from the altar a live coal in his hand, with it touched Isaiah's lips, purifying them and purging his sin. The seraphim are in the later Jewish theology and in Christian angelology classed as the highest of the orders of angels, holding the first place in the first triad of the angelic hierarchy—seraphim, cherubim and thrones.

SERAPION, physician of Alexandria, of the sect of the Empirici, who flourished about the 3d century. He occupied himself almost exclusively with inquiries into the nature of drugs, and was a keen opponent of Hippocrates.

SERAPIS, sĕ-rā'pĭs, or **SARAPIS,** an Egyptian divinity whose worship was introduced into Egypt in the reign of Ptolemy I. It is related by Plutarch and Tacitus that Ptolemy having seen in a dream the image of a god, which he was ordered to remove from the place in which it stood, sent to Sinope, on the suggestion of a traveler named Sosibius, and brought thence a colossal statue, which he sent up to Alexandria. It was declared to represent the god Serapis, affirmed by Manetho to be Pluto or the Jupiter of Sinope. A magnificent temple was built at Alexandria for the reception of the statue of Serapis, and this temple—the Serapeum—was the last hold of the pagans in that city after the introduction of Christianity. Another temple of this god at Memphis, beside the Apis cemetery, was discovered by Mariette in 1850. The Egyptians themselves never acknowledged him in their pantheon, but he was the principal deity in the Greek and Roman towns, and was considered to be either Osiris, Aesculapius, Jupiter or Pluto.

SERBIA, a federal unit of Yugoslavia, located in the heart of the Balkan Peninsula and constituting the east central and most important part of Yugoslavia. From 1878 to 1918 Serbia was an independent kingdom. On the north it is bounded by Hungary and to the east lie Rumania and Bulgaria. On the south its border meets that of Yugoslav Macedonia, then takes a northerly course along Albania until it meets the eastern edge of Montenegro. Following from there the Drina River which separates it from Hercegovina and Bosnia as far as the Sava River, the border finally touches eastern Croatia and the Danube.

Serbia's population on the eve of World War I was 4,800,000, of which 700,000 were Moslems, Albanians, and Turks inhabiting the southern provinces liberated after the Balkan Wars. The remainder of the population was Serbian, belonging to the Serbian Orthodox faith. Before the Balkan Wars the population was 98.4 per cent homogeneous Serb. According to the official census of 1931, the population of Serbia was 5,795,724.

For the geography, topography, and economic development of Serbia, see YUGOSLAVIA.

HISTORY

Concerning the origin of the term "Serb" there are several hypotheses, but until recent times the exact etymology of the word had not been definitely established. One of the theories advanced is that it comes from the Caucasian *ser,* meaning "man," with the plural suffix of *bi* of that language added. The name Serb is mentioned for the first time by the geographer Vibius Sequestrus (6th century A.D.), and the first Serbs appeared in central Europe at the beginning of the 6th century—in Germany (provinces of Magdeburg and Anhalt). The German city of Zerbst (Serbiste in Slav) is a reminder of the early invasion. Serbs in the Balkan Peninsula are mentioned for the first time in 822 by Einhard of Charlemagne's court, but the Byzantine emperor, Constantine Porphyrogenitus, refers to Serbs already being in the Illyric province by the middle of the 7th century.

The Serbs were one of the peoples of the Caucasus and lived on the eastern shores of the Sea of Azov. At the time of the barbarian invasions, they began to move with other Slavs toward the West, a progress that began as early as the 4th century. It has been established that when the Huns invaded Europe in the 5th century, they were accompanied by Slavs. A century later the Slavs had settled in Rumania, and during the 7th century had colonized the Balkan Peninsula by conquest. They proceeded ruthlessly with their colonization, destroying several important cities which had been founded by the Romans—among them being Singidunum (Belgrade), Viminacium (Kostolac on the Danube), Dioclea (Podgorica, now called Titograd, in Montenegro), Salona (Split in Dalmatia). Their democratic, clannish organization was concerned only with the direct interests of their particular tribe or clan; and the tribes themselves had no deeper sense of unity, or consciousness of common interests. This seems to have been the main reason for their anarchic life, and their resultant weakness in spite of numerical strength. It is also the reason why the Slavs have been slow in organizing their own states, and is the evident explanation of the fact that the first Slav states were organized by foreigners.

The Nemanya Dynasty.—Rascia, the first Serb state, was founded in the mountains of southeastern Bosnia and northeastern Hercegovina, and tended, from the 10th century, to expand eastward and southeastward toward the plains of Kosovo and the valleys of the Vardar and Morava. At that time it centered principally around the Raska River, from which it originally took its name. The definite organization of the state was accomplished by Stephen Nemanya (Stevan Nemanja; r. 1168–1196), one of the ablest and most outstanding of the rulers of Serbia, who extended the nucleus of the country into the Morava Valley, and into the Vardar Valley to the south. His son Rastko, later known as St. Sava, was an intelligent and energetic

* Pp. 579-588 deleted. The former Serb, Croat and Slovene State is now Yugoslavia (q.v.).

statesman, and continued the work begun by his father. He founded the independent Serbian Orthodox Church which still bears his name, and his memory is revered by all Serbs.

The Nemanya (Nemanja, q.v.) dynasty ruled during two centuries, producing many powerful kings who from the 14th century on made Serbia the strongest state in the Balkan Peninsula, prepared to take the place of the decadent Byzantine Empire. In 1330 (Battle of Velbuzhd, now Kyustendil), Stephen (Stevan) Uroš III, one of the most famous of the Serbian kings, defeated the Bulgars, driving them out of the Vardar Valley. In 1346, Stephen Dushan or Dušan (Stevan Uroš IV), unlike his predecessors who were crowned kings of Serbia, assumed the title of emperor of the Serbs, Bulgars, Greeks, and Albanians. However, an early death (1355) put an end to his ambitious plans.

The economic and cultural progress of Serbia at this period was above the average European level. Many monasteries of Serbian-Byzantine architectural style (Studenitca, Decani, Gračanica, and others), founded by several kings, bear witness to this highly developed culture of the Serbs. Dushan's code of laws (*Zakonik*), formulated 1349–1354, shows the advanced social structure of the Serbian state.

Under Turkish Rule.—Dushan's successór, Stephen Uroš V, lacked the energy and strength of his father, and the latter's conquests ended by becoming a source of weakness for the state. The Turkish drive toward Europe turned its might toward the Serbs, first defeating them at the Maritsa River in 1371, and then on the Plain of Kosovo in 1389, where the Serbian defenders fought courageously against far superior Turkish forces. In that battle the Serbian prince, Lazar I, was killed, as was also the Turkish sultan, Murad I. Kosovo was not only a battle where crowned heads fell; it marked as well the fall of the independent Serbian state. Serbia continued her precarious independence until 1459, her rulers retreating to the north on the Danube, seeking the protection of the Hungarian kings.

With the downfall of the Serbian state, the nation came under the Turkish yoke where it remained for more than four centuries. It was not until 1804 that the Serbs began their struggle for liberation. During this long Turkish occupation, the Serbian Orthodox Church remained the only national institution not destroyed by the conquerors; it was active in keeping alive the traditions of the old state of the Nemanya and the glorious empire of Dushan, as well as faith in a better future. In the southeastern part of Serbia—Montenegro—the freedom-loving mountaineers retreated to their inaccessible mountains and successfully resisted all Turkish attempts at conquest.

A slow decline of the Turkish Empire began in the 17th century until, in 1683 the Turks were defeated near Vienna. From then on, they gradually retreated southward toward the Danube and Sava rivers. The Porte (Turkish government), however, was slowly losing control not only of its army, but also of its governors in the distant provinces; more and more these officials resorted to terroristic methods to preserve their conquests. Under these conditions the Serbian people grew desperate, and finally, after several unsuccessful attempts, they started (1804) the great national revolution against the Turks.

The Fight for Independence.—The Serbs were led in this revolt by George Petrović, called Karageorge (Karadjordje or Black George), whose family had emigrated to Serbia from Montenegro in the first part of the 18th century. Karageorge, a man of great courage and ability, had fought the Turks from his earliest youth. He was elected by the people as their leader at the outbreak of the revolt, and after a series of victories at Ivankovac, Mišar, and Belgrade (Beograd), he succeeded in freeing all the pashalik (province) of Belgrade from the Turks. In that same year Russia, which was also involved in a war with Turkey, concluded an alliance with Serbia which drew the attention of Europe to this former Ottoman province. Serbia enjoyed a fair degree of autonomy and was self-governing. In the Treaty of Bucharest with Russia in 1812, the Ottoman Empire recognized the autonomy of Serbia and obligated itself to treat the Serbs with moderation.

Turkey, however, taking advantage of the difficult situation of Russia which was then at war with Napoleon, refused to carry out the obligations of the treaty and moved in force against the Serbs. Karageorge was forced to retreat to Austria in 1813, but the Serbs started a second revolt in 1815, led this time by Miloš Obrenovich (Obrenović). Both revolts had originated in Shumadiya, the heart of Serbia.

If Karageorge is remembered as the greatest Serbian hero, Miloš is considered the most astute of Serbian diplomats. He succeeded in obtaining the autonomy of the country when in March 1826 the Porte signed a convention with Russia at Akkarman, by which Turkey bound herself to carry out within 18 months the provisions of the Treaty of Bucharest of 1812.

Later, in the Treaty of Adrianople (Sept. 14, 1829) with Russia, Turkey solemnly engaged herself to honor without delay her obligations toward Serbia, and also to evacuate her army from six counties belonging to the pashalik of Belgrade.

In 1830 the sultan issued a *hatti-sherif* (a solemn personal letter) guaranteeing Serbia's autonomy, under Russian protection, and recognizing Miloš Obrenovich as hereditary prince of Serbia. In 1833, Turkey finally ceded to Serbia the six counties of the pashalik of Belgrade which she still occupied, and Miloš made a state visit to the sultan in 1835 to pay his respects and to thank him for fulfilling his promises.

Although Miloš was known as an able diplomat, in governing his country he used absolutist methods, which in spite of his successes earned him the hatred of his people. He was finally forced to abdicate in 1839. This popular disfavor extended also to his son Michael who, after a short reign, abdicated in 1842. The People's Assembly (Skulpština) then called Karageorge's son Alexander Karageorgevich back to the throne. Alexander ruled from 1842 to 1858, his reign being marked by considerable improvement in the cultural life of the country and the development of the organization of the state. During his reign Serbia moved a step forward toward full independence, when the Congress of Paris in 1856 confirmed the autonomy of Serbia as being guaranteed by all the great powers and not by Russia alone.

In 1858, Prince Alexander, who was engaged in a conflict with the party of "defenders of the constitution" (Ustavobranitelji), also had to abdicate and leave the country.

The old autocrat Miloš Obrenovich, then living in exile in Rumania, was recalled to the throne of Serbia. His reign was short, however, as he died less than two years afterward.

Michael Obrenovich then reascended the throne (1860). He was a well-educated and liberal-minded prince. At this time Europe was dominated by the policy of nationalities encouraged by Napoleon III. National unification was in progress in Germany as well as in Italy. Fired by these examples, Michael formed ambitious plans for liberating the different nationalities still within the Turkish Empire. He entered into negotiations with the rulers of Greece, Rumania, and the neighboring principality of Montenegro, as well as with Serbian national leaders in Bosnia and Bulgaria, with the view to creating a vast alliance against the Ottoman Empire. He also established friendly relations with the Croat leaders—particularly with Bishop Joseph Georg Strossmayer, hoping to promote closer relations between Serbs and Croats. But his plans did not materialize as he was assassinated on June 10, 1868.

The reign of Michael, marked as it was by many diplomatic successes, proved another step toward the complete liberation of Serbia. The Turks had reserved the right to keep garrisons in Belgrade and several other cities, but by patient diplomatic action, supported by France, Great Britain, and Russia, Michael obtained from the Porte in 1867 the withdrawal of the garrisons from Serbia. The only evidence that Serbia was not as yet a fully independent state was the Turkish flag which continued to fly beside the Serbian flag over the evacuated fortresses.

Michael was succeeded by his nephew Milan during whose reign Serbia engaged in two wars with Turkey (1876 and 1877–1878) for the liberation of the Serbs from the Ottoman Empire. The first of these wars against the Turks was waged unsuccessfully by the Serbians and Montenegrins alone. In the second war the Serbians joined forces with the Russians and succeeded in liberating Niš and substantial territories in the south and southeast of Serbia. But the policy of Russia was to favor Bulgaria at the expense of Serbia in order thus to pave the way for access to the Aegean Sea and the Mediterranean. The Treaty of San Stefano (March 3, 1878) created a Great Bulgaria and deprived Serbia of almost all her military conquests. The Berlin Congress (q.v.) in 1878 nullified the Treaty of San Stefano and established a new status in the Balkans. Serbia was substantially enlarged in the south and southeast; but above all she was now recognized as a fully independent state. On the other hand, the Congress of Berlin decreed that Austria-Hungary occupy the predominantly Serbian provinces of Bosnia and Hercegovina. This occupation led to new troubles in the Balkans and finally became one of the indirect causes of World War I.

Establishment of the Kingdom.—On Feb. 22, 1882, the Serbian Parliament proclaimed Serbia a kingdom and Milan its first king. In 1885, after the unification of Bulgaria with Eastern Rumelia, Milan attacked the Bulgars, fearing they would become the strongest state in the Balkans. In this war he was unsuccessful and later had to face considerable difficulties at home. Finally he was forced to abdicate in 1889 in favor of his son Alexander.

Alexander I. Obrenovich was the most unpopular king in the history of Serbia, and his marriage to Draga Mashin, a commoner widow 10 years his senior, greatly increased his unpopularity. On June 10, 1903, Alexander and Queen Draga were assassinated. With this event the Obrenovich dynasty came to an end.

At Alexander's death, the Serbian Assembly called Peter I Karageorgevich to the throne. He was the son of Alexander Karageorgevich and the grandson of Karageorge himself. Peter had spent most of his life in exile. He had been educated in France and Switzerland where he had been imbued with liberal and democratic ideals. His reign marked the beginning of a new era for Serbia during which the country made considerable progress in all fields of national activity. It developed a parliamentary system and democratic institutions and achieved economic and social progress which might well have served as an example for many other countries. The new Serbia attracted not only her brothers under the Turkish rule, but also the Serbs and Croats in the Austro-Hungarian Empire. Austria-Hungary, afraid of Serbia's progressiveness, tried to arrest it by annexing Bosnia and Hercegovina in 1908, while engaging in an economic war with the Serbs. Two years later she refused to renew the trade agreement with Serbia, forcing the Serbs to seek new markets for their exports. The Serbian government passed through this economic crisis successfully, and directed its efforts toward the creation of a Balkan League (q.v.) for the liberation of the Balkans from the Turks.

The Balkan Wars (1912–1913).—In October 1912, the Balkan League (Serbia, Montenegro, Bulgaria, and Greece) engaged in war against Turkey. The Turkish Army was defeated, and those parts of the Balkans still under Turkish rule were liberated after 500 years. The Serbian Army particularly distinguished itself in a series of victorious battles—Kumanovo, Novi Pazar, Monastir (Bitolj)—and also took a prominent part in the seige and capture of the great Turkish fortress of Adrianople (Edirne). However, the Balkan allies failed to agree on the division of the territory thus liberated from the Turks, and Bulgaria refused to submit the issue to arbitration by the czar of Russia according to the provisions of the Treaty of Alliance between Serbia and Bulgaria. Encouraged by Austria-Hungary, Bulgaria attacked Serbia on June 29, 1913, carrying hostilities against the Greeks also. Bulgaria, however, was defeated, first at Bregalnica, then in a number of other battles. With the entrance of Rumania into the war on the side of Serbia, Montenegro, and Greece, the Bulgarians sued for peace which was concluded in Bucharest on Aug. 10, 1913. By the Treaty of Bucharest, Serbia was awarded large territories in the Valley of the Vardar and in the southwest toward Albania. (See also separate article BALKAN WARS.)

World War I.—This successful conclusion of the Balkan Wars increased Serbia's prestige with the South Slavs (Serbs, Croats, and Slovenes) in Austria-Hungary, but caused the Austrian Empire to look upon Serbia as a new menace to its own existence. Taking as a pretext the assassination of the Archduke Francis Ferdinand in Sarajevo (Bosnia) by a young Serbian revolutionary (June 28, 1914), Austria-Hungary declared war on Serbia, July 28, a move which resulted in World War I (see WAR, EUROPEAN—*Diplomatic History*).

During the war, Serbia's army was brilliantly

led by Prince Alexander, who, in 1914, had been appointed regent by his aged and ailing father, Peter I. Though vastly outnumbered by the enemy, the Serbians achieved remarkable successes, twice defeating the army of the Dual Monarchy. For more than a year Serbia successfully resisted the invaders, and it was not until both the German and Bulgarian armies threw their might on the side of Austria-Hungary that the Serbs had to give ground. In the memorable and bloody retreat through the Albanian mountains, Alexander succeeded in bringing out of Serbia 200,000 of his soldiers. Aided and equipped by the Allies, this reorganized Serbian Army played an important part on the Salonika front, and succeeded in breaking through the enemy lines at Dobropolje and Kajmakchalan (Kaimakčalan) in September 1918.

On Dec. 1, 1918, Serbia merged its existence as an independent kingdom in the newly created Kingdom of Serbs, Croats, and Slovenes. (See Yugoslavia.)

Constantin Fotitch.

SERBIAN LANGUAGE. See also Slav Languages.

SERBS, CROATS AND SLOVENES, Kingdom of, (Slav, Kraljevina Srbi, Hrvata i Slovenaca), a union of several Slav states in the Balkan Peninsula, since 1929 known as Yugoslavia (q.v.).

SEREMBAN, sĕ-rĕm'băn, town, British Malaya, capital of the state of Negri Sembilan, Federation of Malaya, 42 miles northwest of Malacca. It is on the west coast railway up the Malay Peninsula, and a branch line connects it with Port Dickson, the state's seaport. Pop. (1947) 35,274.

SERENA, La. See La Serena.

SERENADE, properly, music performed in a clear night; hence a musical entertainment provided by a lover under the window of his mistress. It consists generally of instrumental music, but vocal is sometimes added. The practice existed even among the Greeks and Romans. Such music is sometimes performed merely as a mark of esteem and good will toward distinguished persons, and then is not infrequently accompanied by long processions with torches. Hence the different character of serenades. A single singer may accompany his song with the guitar, mandolin, lute, or the like; or wind instruments may be used, as flutes, horns, clarinets, or hautboys.

SERF, in feudal usage, a member of the class of peasants who were bound to the land of their master, which they cultivated. Under the feudal system, from the vassals of the king downward, the whole community was subject to certain degrees of servitude, and it was only on condition of specific services to be rendered to his superior that any individual held his fief. In the case of the lower classes this servitude amounted to an almost complete surrender of their personal liberty. There were two classes of laborers, the villeins and the serfs proper. The former occupied a middle position between the serfs and the freemen. Henry Hallam (q.v.) remarks, in reference to these two classes, that in England, at least from the reign of Henry II, one only, and that the inferior, existed; serfs were incapable of property and destitute of redress except against the most outrageous injuries. A serf could not be sold, but could be transferred along with the property to which he was attached. The revival of the custom of manumission counteracted the rapid increase of serfs. A serf could also obtain his freedom by purchase, or by residing for a year and a day in a borough, or by military service, or by dying. By these various means the serf population gradually decreased. In most parts of the Continent they had disappeared by the 15th century. The extinction of serfdom in England and Scotland was very gradual. As late as 1574, Elizabeth issued a commission of inquiry into the lands and goods of her bondsmen and bondswomen in specified counties in order to compound for their manumission; and even in the 18th century a species of serfdom existed among Scottish miners. Serfdom in Russia was abolished by a manifesto of Alexander II (q.v.) on March 3, 1861. See also Feudal System.

SERGE, a kind of twilled worsted cloth, used for ladies' dresses, gentlemen's summer suits, and so forth. Navy serge is a thick durable make of this cloth.

SERGEANT, United States Army, a member of the first three grades of the noncommissioned officer corps (corporal is the fourth grade). The three grades are designated as master sergeant, sergeant first class, and sergeant. A sergeant is either a subordinate commander or a technical specialist. The United States Air Force and United States Marine Corps have corresponding grades of sergeants with similar duties. Many state and municipal police departments have a position of sergeant, usually ranking just below that of police lieutenant.

SERGEANT AT ARMS, an executive and disciplinary officer of legislative bodies. In both houses of the Congress of the United States his authority may not be ignored with impunity. In cases of disorder he carries the mace down the aisle of the House. Should any member continue the disorder after this demonstration he is guilty of contempt. The sergeant at arms also serves processes and, if necessary, arrests absent members during sessions when their presence is necessary to constitute a quorum. In the House of Representatives he has charge of the members' payroll.

SERGIPE, sĕr-zhē'pĕ, state, Brazil, smallest of the states of the republic, 8,321 square miles in area. The São Francisco River, on the north, separates it from Alagoas, and Baía (Bahia) bounds the state on the west and south; it is bounded on the east by the Atlantic Ocean. While the coast is flat and sandy, the interior consists of wooded hills. Iron ore and crystal quartz occur. Forests on the slopes of the hills are rich in valuable cabinet woods and dyewoods. Stock raising on the western plateaus is of importance, and sugarcane, cacao, cotton, tobacco, corn, rice, and flax are cultivated. There are sugar refineries, distilleries, flour mills, and tanneries. Aracajú, the capital, is at the mouth of the Cotinguiba River. Pop. (1947) 631,025.

SERGIUS, sûr'jĭ-ŭs, the name of four popes, as follows:

SERGIUS, I: b. Syria, about 630; d. Rome 701. He succeeded Conon in 687. He opposed several provisions of the Quinisext Council of Constantinople in 692 and in consequence Justinian II sent to arrest him. Sergius, however, was protected by the exarch of Ravenna. He died in Rome after a pontificate of nearly 14 years.

SERGIUS II: b. Rome; d. 847. He succeeded Gregory IV in 844, and during his pontificate the Saracens from Africa ascended the Tiber, and plundered the environs of Rome.

SERGIUS III: d. 911. He was raised to the papal chair in 904, after the anti-pope Christopher had been expelled. On the strength of Luitprand's testimony, his character has been deeply calumniated. But contemporary chroniclers speak of him in the highest terms as a pious and enlightened pope. He restored the Lateran Church and filled the Holy See nearly seven years.

SERGIUS IV: d. 1012. He succeeded John XIX, in 1009, and during his pontificate, and as a result of his exhortations, the Italian princes united to drive out the Saracens from the country. It was in his time also that the Normans began to enter Italy.

SERI (sā-rē′) **INDIANS** (Opata, "spry"), an exceedingly primitive tribe of North American Indians, speaking a distinct language and living on and restricted to Tiburon Island, in the Gulf of California, adjacent to Sonora, Mexico. Although known since 1540, when some of Coronado's men visited them, almost nothing was known of their character, save that they were warlike and extremely conservative, until Dr. W. J. McGee led a small expedition among them, in the interests of science in 1894 and again in 1895. The Seris are unusually tall and well-built; they wear little clothing and subsist chiefly on turtles, water-fowl, fish and other food of the sea, eked out with the vegetal and animal products of the mainland desert. Their houses are flimsy bowers of cactus and shrubbery, sometimes rudely shingled with turtle shells and sponges. Bows and arrows are habitually used as weapons, harpoons of cane are employed for taking turtles, and unworked bowlders or cobbles form a ready means for serving meat, crushing bones, mulling seeds, etc. They make graceful balsas of canes lashed together for use in navigating the strait between their island and the mainland; manufacture a very light pottery and some basketry. Shells are used for cups and to some extent for implements. The modern Seris are loosely organized in a number of maternal groups or clans, which are notable for the prominence given to mother-right in marriage and for some other customs. Polygamy prevails. These savages manifest an implacable hatred toward aliens, whether Caucasian or Indian, and the shedding of alien blood is regarded as their highest virtue. Two centuries ago the population of the tribe was estimated at several thousands, but it has been reduced by almost constant warfare, so that now it is barely 350. Consult McGee, 'The Seri Indians'; 17th Report of the Bureau of American Ethnology, Washington, D. C.

SERICULTURE. See Silk and Silk Industry.

SERIES. A series is a succession of numbers or *terms,* usually proceeding according to some definite law. The law of the series may either define how a given term is derived from those that precede it, or it may define a term as a function of the number denoting the position which it occupies in the series. Thus, the series 1, 2, 3, 5, 8, 13, . . . is such that each term after the first two is obtained by adding together the two terms immediately preceding it, and the law of the series might be expressed by the formula $u_{n+1} = u_{n-1} + u_n$, in which u_{n-1}, u_n, u_{n+1} are any three consecutive terms. On the other hand, the series $1, \frac{2}{3}, \frac{3}{5}, \frac{4}{7}, \ldots$ may be defined by the law that the nth term of the series is $\frac{n}{2n-1}$. Each term is then a function of the number n which determines its position in the series. One and the same series may frequently be defined in both ways. Thus, the series, $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$ is such that each term may be obtained from the preceding one by multiplying it by $\frac{1}{2}$. It may also be defined by the formula $\frac{1}{2^{n-1}}$ as the expression for the nth term. A series is not uniquely determined when a number of its terms are given. In fact, an infinity of series may be found which include as terms any finite number of arbitrarily assigned numbers. In such a case the simplest law that can be found is naturally to be taken as *the law* of the series. Important use is made of this principle in the physical sciences. Series of numbers frequently arise in connection with experimental observations, which evidently proceed according to some definite law, and it is often of great interest to determine the nature of the law. Such series occur, for example, in the theory of spectrum analysis. Balmer's formula $c\frac{n^2}{n^2-4}$, in which c is a certain constant, determines, for different integer values of n, the wave-lengths of a long series of lines in the hydrogen spectrum. A variety of formulas have been obtained for other spectra. A very instructive account of the methods used in determining such series is given in Kayser's 'Handbuch der Spectroscopie,' Vol. II, pp. 503–573.

A series is said to be *finite* or *infinite* according as the number of its terms is limited or unlimited.

Finite Series.

The law of the series being given, the most important problems relating to a finite series are the determination of the term occupying a given position and finding the sum of the series. The following cases are those of chief interest.

Arithmetic Series.— This series is $a, a+d, a+2d, \ldots, l$, so that the difference between any two consecutive terms is constant and equal to d. The nth term l is evidently obtained by adding d $n-1$ times to a and hence $l = a + (n-1)d$. If S denote the sum of the series, then $S = a + (a+d) + (a+2d) + \ldots + l$. By writing the terms in reverse order, the sum may also be expressed in the form

$$S = l + (l-d) + (l-2d) + \ldots + a.$$

The addition of these two equations gives $2S = (a+l) + (a+l) + \ldots$ to n terms, whence $S = \frac{1}{2}n(a+l) = \frac{1}{2}n[a + (n-1)d]$. In particular the sum of the first n integers 1, 2, 3, . . ., n is

$\frac{1}{2}n(n+1)$, and the sum of the odd integers 1, 3, 5, . . ., $2n-1$ is n^2.

Higher Arithmetic Series.—The general expression $a+(n-1)d$ for the nth term of an arithmetic series is an integral function of the first degree in n. A more general series may be formed in which the expression for the nth term is an integral function of degree s in the n. Such a series is called a *higher arithmetic* series of order s. Let $a_1, a_2, a_3, \ldots$ represent the series. A new series $b_1, b_2, b_3, \ldots$ is formed from this by taking the differences of consecutive terms, so that $b_1 = a_2 - a_1$, $b_2 = a_3 - a_2$, etc. This is called the series of first differences. Let a series $c_1, c_2, \ldots$ be formed from $b_1, b_2, \ldots$ in like manner. These are the second differences. Let $d_1, e_1, \ldots$ be the first terms in the series of third, fourth, . . . differences respectively. Since a_n is a polynomial of degree s in n and a_{n+1} is the same polynomial in $(n+1)$, it follows that b_n, which equals $a_{n+1} - a_n$, is of degree $s-1$ in n; and, finally, that the nth term of the series of $(s-1)$th differences is of degree one in n; that is, the last series of differences is a simple arithmetic series. The series of sth powers of the natural number 1, 2^s, 3^s, . . . , n^s is the simplest example of a higher arithmetic series of order s.

The nth term of the series $a_1, a_2, a_3 \ldots$ can readily be expressed in terms of $n, b_1, c_1, \ldots$ namely,

$$a_n = a_1 + (n-1)b_1 + \frac{(n-1)(n-2)}{1\cdot 2}c_1 + \frac{(n-1)(n-2)(n-3)}{1\cdot 2\cdot 3}d_1 + \ldots,$$

the last term of the formula being of degree s in n. With fractional values of n this formula is much used for the purpose of interpolating between the terms of a given series numbers which shall follow the same general law of variation. For example, suppose it be required to find log 91.43, given log 91 = 1.9590414, log 92 = 1.9637878, log 93 = 1.9684829, log 94 = 1.9731279. The required number is intermediate between log 91 and log 92, which are the first and second terms of the series having log $(90+n)$ for its nth term. As the number 91.43 corresponds to $n = 1.43$, the value of log 91.43 may be calculated approximately by assuming that for a small number of terms the series of logarithms coincides very nearly with a higher arithmetic series of order s, the closeness of the approximation increasing with higher values of s. The first terms of the successive series of differences are $b_1 = .0047464$, $c_1 = -.0000513$, $d_1 = .0000012$, etc. First try $s = 1$, that is, use only two terms of the formula for a_n. This gives log $91.43 = 1.9590414 + .43(.0047464) = 1.9610824$, which is correct to only five decimals. With $s = 2$, log $91.43 = 1.9610886$, which is less than the true value by one unit in the seventh place of decimals. With $s = 3$, that is, by using four terms of the formula for a_n, the value is obtained correctly to seven decimal places.

Geometric Series.— This is composed of the terms, $a, ax, ax^2, ax^3, \ldots$ Each term is formed from the one preceding by multiplying it by x, so that the nth term is ax^{n-1}. If S denote the sum of n terms of the series, then

$$S = a + ax + ax^2 + \ldots + ax^{n-1}.$$

The multiplication of this expression by x gives $xS = ax + ax^2 + ax^3 + \ldots + ax^n$, whence, by subtracting from the preceding, $(1-x)S = a - ax^n$, and accordingly $S = \frac{a(1-x^n)}{1-x}$

Recurring Series.—A more general form of series is the *arithmetico-geometric* series, in which the nth term is of the form $(a+bn)x^{n-1}$ It reduces to the arithmetic series when $x = 1$, and to the geometric series when $b = 0$. This in turn is a special case of a *recurring* series, which is defined as follows: Let $a_1, a_2x, a_3x^2, \ldots, a_nx^{n-1}$ be the terms of such a series. If $r+1$ successive coefficients a_i are connected by a homogeneous linear relation of the form $a_n + p_1a_{n-1} + p_2a_{n-2} + \ldots + p_ra_{n-r} = 0$, in which $p_1, p_2, \ldots, p_r$ are given numbers and $n > r$, the series is called a *recurring series of order r*. The sum of n terms of a recurring series can always be found. The result is a rational fraction in x. The method of summation may be illustrated by the series of order 2. The defining relation is

$$a_n + p_1a_{n-1} + p_2a_{n-2} = 0.$$

Let $S = a_1 + a_2x + a_3x^2 + \ldots + a_nx^{n-1}$. Multiply by $1 + p_1x + p_2x^2$. This gives

$$(1 + p_1x + p_2x^2)S = a_1 + (a_2 + p_1a_1)x + (a_3 + p_1a_2 + p_2a_1)x^2 + (a_4 + p_1a_3 + p_2a_2)x^3 + \ldots + (a_n + p_1a_{n-1} + p_2a_{n-2})x^{n-1} + (a_np_1 + a_{n-1}p_2)x^n + a_np_2x^{n+1}.$$

Since $a_s + p_1a_{s-1} + p_2a_{s-2} = 0$, the above expression reduces to

$$a_1 + (a_2 + p_1a_1)x + (a_np_1 + a_{n-1}p_2)x^n + a_np_2x^{n+1},$$

and hence

$$S = \frac{a_1 + (a_2 + p_1a_1)x + (a_np_1 + a_{n-1}p_2)x^n + a_np_2x^{n+1}}{1 + p_1x + p_2x^2}.$$

The Harmonic Series is $\frac{1}{a}, \frac{1}{a+d}, \frac{1}{a+2d}, \ldots,$ its terms being the reciprocals of the terms of an arithmetic series. The nth term is accordingly $\frac{1}{a+(n-1)d}$. The series is so named because the harmonic tones of a fundamental musical note are produced by the divisions of a vibrating string (or column of air in a tube) into lengths, which form a harmonic series. No formula exists for the sum of n terms of a harmonic series.

Infinite Series.

Convergent Series.—Let $u_1, u_2, \ldots, u_n, \ldots,$ be the terms of an infinite series, and let S_n denote the sum of the first n terms. If S_n approaches a definite, finite limit as n increases to infinity, the given series is said to be *convergent*. If, on the other hand, S_n increases without limit, the series is *divergent*. If S_n does not approach any limit, the series is called indeterminate, as in the case of the series $1-1+1-1+1-\ldots$, for which, S_n takes the values 1 and 0 alternately as n increases. To illustrate these definitions, consider the infinite geometric series $a + ax + ax^2 + \ldots + ax^{n-1} + \ldots$ By the formula given above for the sum of a geometric series $S_n = \frac{a(1-x^n)}{1-x}$. If x is numerically less than unity, x^n diminishes to zero as n increases to infinity, and hence S_n approaches $\frac{a}{1-x}$ as a limit. This expression

is called the *generating function* of the series. The series and its generating function are equal for all values of x for which the series is convergent, that is, for values of x numerically less than 1. But if x is numerically greater than 1, S_n approaches infinity as n increases without limit. The series is then divergent and is no longer equal to the generating function. Similarly, with a recurring series, if its terms approach zero as a limit with increasing n, the terms a_nx^n, $a_{n-1}x^n$, a_nx^{n+1} in the above formula for the sum of n terms of a series of order 2 approach zero and hence S_n has for limit $S=\frac{a_1+(a_2+p_1a_1)x}{1+p_1x+p_2x^2}$. A like result holds for a recurring series of any order.

A series can represent its generating function only for such values of the variable (or variables) on which it depends as will make it convergent, and hence the question of the convergence of a series is of paramount importance. Suppose at first that the terms of the series are positive. Then, if the ratio $u_{n+1}:u_n$ becomes and remains less than a proper fraction k as n increases without limit, the series $u_1+u_2+\ldots+u_n+\ldots$ is convergent. For in that case $u_{n+1}<ku_n$, $u_{n+2}<ku_{n+1}<k^2u_n$, $u_{n+3}<ku_{n+2}<k^3u_n$, and so on. Hence $u_n+u_{n+1}+u_{n+2}+u_{n+3}+\ldots<u_n(1+k+k^2+k^3+\ldots)$. But as k is a positive number less than 1, the infinite geometric series $1+k+k^2+\ldots$ is convergent and equals $\frac{1}{1-k}$. Accordingly $u_n+u_{n+1}+\ldots$ which is less than the finite quantity $\frac{u_n}{1-k}$, is a convergent series. If to this portion of the series the finite sum $u_1+u_2+\ldots+u_{n-1}$ be added, the result is finite and the given series is, therefore, convergent. While the condition just given is sufficient to ensure the convergence of a series it is not necessary. Thus, if a and b are such that $0<a<b<1$, then the series $a+b^2+a^3+b^4+a^5+\ldots$ is convergent, since it consists of the sum of the two convergent geometric series $a+a^3+\ldots$ and $b^2+b^4+\ldots$. But $u_{n+1}:u_n$ alternates between large and small values as n increases and does not, therefore, remain less than a proper fraction.

If some of the terms of a given series are negative, the series is convergent provided that the series obtained by changing the signs of all the negative terms is convergent. For example, the series $1-k+k^2-k^3+k^4-\ldots$, in which k is a positive number, is less than the series $1+k+k^2+k^3+\ldots$ and is, therefore, convergent if $k<1$. It follows, from the preceding considerations that any series is convergent if the ratio $u_{n+1}:u_n$ has a limit numerically less than 1 as n increases to infinity. Thus, for the logarithmic series $\log(1+x)=x-\frac{1}{2}x^2+\frac{1}{3}x^3-\ldots\pm\frac{x^n}{n}\mp\frac{x^{n+1}}{n+1}\ldots$ the numerical value of $u_{n+1}:u_n$ is the same as that of $\frac{x^{n+1}}{n+1}:\frac{x^n}{n}=\frac{n}{n+1}x$. The limit as n increases to infinity is x. The series will accordingly be convergent is x is numerically less than 1. For the exponential series

$$e^x=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots+\frac{x^n}{n!}+\ldots,$$

$$u_{n+1}:u_n=\frac{x^n}{n!}:\frac{x^{n-1}}{(n-1)!}=\frac{x}{n}.$$

For any finite value of x this ratio becomes and remains a proper fraction as soon as n exceeds x in absolute value. Hence the series is convergent for all finite values of x.

A series of positive and negative terms is said to be *absolutely* convergent if the series obtained by making all of the terms positive is convergent. When the second series is divergent it sometimes happens that the first series is convergent, in which case it is called *conditionally* convergent, because the value of the sum is conditioned on the arrangement of the terms. For example, the logarithmic series is absolutely convergent for all values of x numerically less than 1. If $x=1$, it becomes $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\ldots$, which is convergent and equals $\log 2$. But the series $1+\frac{1}{2}+\frac{1}{3}+\ldots$ obtained by making all the terms positive is divergent. A conditionally convergent series has the peculiar property that by changing the sequence of the terms the sum of n terms may be made to approach any desired limit as n increases to infinity, as may be exemplified by the preceding series. For let c be any number. Select in order as many of the positive terms of $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\ldots$ as will be sufficient to make a sum greater than c. Then select just enough negative terms so that when added to these the sum shall become less than c. Then add more positive terms until the sum becomes greater than c, and so continue. This process is possible, since the positive or the negative terms alone form a diverging series. With such an arrangement of terms the sum may be made to approach as near to c as desired.

Uses of Series.— Series are of the utmost value as affording a means for the expression of any given function. In particular, functions which are defined as solutions of differential equations are most frequently not expressible in any other form. In the theory of functions as developed by Weierstrass the convergent power-series is made the fundamental instrument of investigation, and from the properties of its defining series the nature of a function is determined. (See COMPLEX VARIABLE, THEORY OF FUNCTIONS OF). The expression of a function in the form of a series is of especial importance when it is desired to calculate its numerical value. It is by this means that various numerical tables, such as the logarithmic and trigonometric, are calculated.

Taylor's series: $f(x)=f(a)+f'(a)\,(x-a)+\frac{1}{2!}f''(a)\,(x-a)^2+\ldots+\frac{1}{n!}f^{(n)}(a)\,(x-a)^n+\ldots$ is the formula most generally useful for the purpose of expanding any given function $f(x)$ in ascending powers of $x-a$, a being a given constant so chosen that the functions and its derivatives $f'(x)$, $f''(x)$, $\ldots$, $f^{(n)}(x)$, $\ldots$ are finite and continuous for values of x sufficiently near to a. Another form for Taylor's series, and the one to which the name is more frequently applied, is obtained by writing h in the place of $x-a$ so that $x=a+h$. The above equation then takes the form

$$f(a+h)=f(a)+f'(a)h+\frac{1}{2!}f''(a)h^2+\ldots+\frac{1}{n!}f^{(n)}(a)h^n+\ldots$$

This series is convergent, if h is not too large. *Maclaurin's series* for the expansion of a function of x in ascending powers of x is obtained as a special case of the first form of Taylor's

series by putting $a=0$. The formula is of course inapplicable if the given function or any of its derivatives are not finite when $x=0$.

For the purposes of numerical calculation it is essential to know how close an approximation to the true value of the function may be obtained by using a given number of terms in Taylor's series and discarding the rest. If S_n denote the sum of the first n terms of the series and R_n the remainder of the series, then $f(x)=S_n+R_n$ and the amount of error introduced by using S_n as the approximate value of $f(x)$ is equal to the remainder R_n. An expression for the remainder in Taylor's series (second equation) was obtained by Lagrange in the form $R_n=\frac{1}{n!}f^{(n)}(a+\theta h)h^n$, in which θ denotes a certain number between 0 and 1. To illustrate, the formula for $\sin(a+h)$ expressed in terms of Lagrange's remainder is

$$\sin(a+h)=\sin a+\cos a\cdot h-\tfrac{1}{2}\sin a\cdot h^2-\frac{1}{3!}\cos a\cdot h^2+\ldots+\frac{1}{n!}\sin\left(a+n\frac{\pi}{2}+\theta h\right)h^n.$$

Since $\sin x$ does not exceed 1 in numerical value the error in discarding the remainder of the series after n terms is not numerically greater than $\frac{h^n}{n!}$. If, for example, knowing $\sin 45^\circ=\cos 45^\circ=\frac{1}{\sqrt{2}}$, it is desired to calculate $\sin x$ for succeeding angles at intervals of 1″, the value for h is taken to be .0000048481, which is the radian measure for 1″ in degree measure. Two terms of the preceding formula give the value of sin 45° 1″ correct to 10 decimals. For the remainder is $R_2=\frac{-\sin\left(\frac{\pi}{4}+\theta h\right)}{2}\cdot h^2$, the first factor of which differs slightly from $-\frac{1}{2\sqrt{2}}$, while h^2 has no significant figure before the eleventh decimal place.

The cases in which Lagrange's formula is practicable for determining the limit of error are comparatively few in number. A convenient limit of error may frequently be found by comparing the given series with a simpler one of less rapid convergence, the limit of error for which can be determined. In particular, a series $u_1-u_2+u_3-u_4+\ldots$ of alternately positive and negative terms which are numerically decreasing toward zero as a limit is convergent, and the error in taking only n terms is less than the next succeeding term u_{n+1}, but greater than $u_{n+1}-u_{n+2}$. For the series may be written $(u_1-u_2)+(u_3-u_4)+\ldots$, which is a sum of positive terms and, therefore, increases, with the number of terms, toward a finite limit, or becomes indefinitely large. But the series may also be written $u_1-(u_2-u_3)-(u_4-u_5)-\ldots$, in which all the terms after the first are negative and hence the sum is less than u_1. The numerical value of R_n is $u_{n+1}-u_{n+2}+u_{n+3}-\ldots$, which, by a repetition of the preceding argument, is greater than $u_{n+1}-u_{n+2}$ and less than u_{n+1}. Thus, for the logarithmic series mentioned above, the error in stopping with the nth term is less than $\frac{x^{n+1}}{n+1}$ (if x is positive). For $x=\frac{1}{10}$ the value of $\log(1+x)$ is given by S_n correct to at least $(n+1)$ decimal places. For values of x near 1 the series converges very slowly. A more rapidly converging series can be obtained by changing x into $-x$, which gives

$$\log(1-x)=-x-\tfrac{1}{2}x^2-\tfrac{1}{3}x^3-\ldots,$$

whence, by subtracting the series for $\log(1+x)$,

$$\log\frac{1+x}{1-x}=2(x+\tfrac{1}{3}x^3+\tfrac{1}{5}x^5+\ldots).$$

In this x is replaced by $\frac{1}{2z+1}$, from which follows

$$\log\frac{z+1}{z}=\log(z+1)-\log z=2\left[\frac{1}{2z+1}+\frac{1}{3(2z+1)^3}+\ldots\right].$$

This series is convergent for all positive values of z. The remainder after n terms is

$$2\left[\frac{1}{(2n+1)(2z+1)^{2n+1}}+\frac{1}{(2n+3)(2z+1)^{2n+3}}+\ldots\right]$$

which is evidently less than the geometric series

$$\frac{2}{(2n+1)(2z+1)^{2n+1}}\left[1+\frac{1}{(2z+1)^2}+\frac{1}{(2z+1)^4}+\ldots\right]$$

the sum of which is $\frac{1}{2(2n+1)(2z+1)^{2n+1}(z^2+z)}$. The error in neglecting R_n is accordingly less than the value of this expression.

The importance for numerical computation of having a series of sufficiently rapid convergence is illustrated by the formula for π. Gregory's series is $\frac{1}{4}\pi=1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots$ which converges so slowly that according to Newton it would require 5,000,000,000 terms and 1,000 years' time to calculate the value of π to 20 decimals. On the other hand, by means of Machin's formula, which converges very rapidly, Shanks has computed the value of π to 707 decimal places.

Divergent Series.— It was supposed by the earlier mathematicians that divergent series were entirely useless. There is, however, a class of such series that have been found not only useful but necessary for the purposes of approximate computation. These have been employed for a long time by astronomers even after their divergence had been proved, their use being justified by the close agreement between calculation and observation. The series in question have the property that the terms at first decrease in numerical value until a certain minimum term is reached, after which they increase without limit. The series is converging as far as its minimum term, beyond which it is diverging. The converging portion of the series frequently affords a very good approximation to the value of the given function. The series for the probability integral $\int_0^x e^{-t^2}dt$ is an example of this kind. By expanding e^{-t^2} in powers of t^2 and integrating term by term, this function is expressed by means of the series $x-\frac{1}{3}x^3+\frac{1}{5\cdot 2!}x^5-\frac{1}{7\cdot 3!}x^7+\ldots$, which is convergent for all finite values of x. For large values of x the convergence is too slow for practical purposes and the series

$$\frac{\sqrt{\pi}}{2}-\frac{e^{-x^2}}{2x}\left[1-\frac{1}{2x^2}+\frac{1\cdot 3}{2^2\cdot x^4}-\frac{1\cdot 3\cdot 5}{2^3\cdot x^6}+\ldots\right]$$

is used instead. While this series is divergent

beyond a certain term, the sum of the converging portion gives an approximation having an error less than the numerical value of the last term used. This approximation is so good and the convergence so rapid that for values of x as small as 3 this series is more convenient to use than the first one and gives a value correct to eight decimals, the first 11 terms being convergent, while for $x = 10$ the first 100 terms are convergent and give a value which is correct to at least 110 decimal places.

The theory of divergent series has recently been receiving considerable attention, chiefly from the French mathematicians. In particular, the problem of determining in how far the divergent series may validly be used as a purely formal representation of a function has been studied by Poincaré, who has developed some important and far-reaching results. An interesting account of the present state of the subject is given by Borel in his 'Leçons sur les séries divergentes' (Paris 1901).

Series of Functions; Multiple Series.— It is often important to express a function as a series the terms of which are given functions such as trigonometric or Bessel functions. Such series are of great service in mathematical physics, especially the *Fourier series* of sines and cosines of multiple angles, which is much used for representing functions having a periodic character. This series was first employed for that purpose by Fourier (1822) in his 'Théorie analytique de chaleur.'

In a simple series $u_1, u_2, \ldots$, the general term u_n is a function of a single integer n defining its position in the series. A *double series* is one in which the general term $u_{m,n}$ is a function of two independent integers m, n. A *multiple series* is one in which the general term is a function of several integers $m, n, p, \ldots$. Such series are of fundamental importance in the study of various classes of functions such as the elliptic functions and the multiple theta functions.

History and Literature.— Some of the properties of arithmetic and geometric series were known in very ancient times, as the oldest manuscript in existence, the Rhind papyrus, which is believed to be a copy of a work dating back 3,000 or more years before Christ, gives an account of some problems which are solved by means of these series. There is considerable ground for supposing that the general formula for the sum of an arithmetic series was known at that time, although it does not occur explicitly in mathematical literature until the time of Archimedes (287–212 B.C.). The formula for the sum of a geometric series was known to the Greeks as it is given by Euclid (about 300 B.C.), while the summation of the infinite series $1 + \frac{1}{4} + (\frac{1}{4})^2 + (\frac{1}{4})^3 + \ldots$ was effected by Archimedes. The general expression for the sum of an infinite geometric series was first given by Vieta (1540–1603 A.D.). A formula for the sum of the squares of the positive integers was given by Archimedes, and for their cubes by Nikomachus (about 100 A.D.). Except for these two particular cases no knowledge of the summation of higher arithmetic series is apparent before the 16th century. The subject as we now know it was developed chiefly in the following century and it took its present form in the 'Ars conjectandi' of Jacob Bernoulli (1713). The name "arithmetic series of higher order" was given by Leibnitz. Newton was the first to recognize the importance of infinite series as an instrument of mathematical investigation. His results were published in 1669 (not printed until 1704) in a work entitled 'Analysis per Aequationes Numero Terminorum Infinitas.' A systematic treatment of series was given by Euler in his 'Introductio in analysin infinitorum' (1748). The principle that an infinite series cannot be safely employed unless it is convergent was first given in this work. Gauss (1813) inaugurated the modern epoch in the theory of infinite series in his memoir, 'Disquisitiones generales circa seriem infinitam, $1 + \frac{a \cdot b}{1 \cdot c} x + \frac{a(a+1) \cdot b(b+1)}{1 \cdot 2 \cdot c \cdot (c+1)} x^2 + \ldots$' He insisted on rigorous tests for convergence and was first to give definite criteria for convergence and divergence. In the 'Cours d'analyse de l'Ecole Polytechnique' (Paris 1821), Cauchy extended the theory of power-series to the expansion of functions of a complex variable and gave the important theorem that a series is convergent if the limit of $u\sqrt[n]{n}$ is numerically less than 1 when n increases to infinity. Further contributions, including additional criteria for convergence and a development of the principle of continuity of series, were made by Abel (1826) in his 'Recherches sur la série,

$$1 + \frac{m}{1} x + \frac{m(m-1)}{1 \cdot 2} x^2 + \ldots$$

'Œuvres complètes,' Vol. I, p. 223). This celebrated memoir is a model of scientific accuracy and comprehensiveness, and exerted an important influence on the growing spirit of rigorous and critical investigation.

Among modern works on series the following may be mentioned: Chrystal's 'Algebra' (Edinburgh 1886), chaps. xx, xxvi–xxxi; Osgood's 'Introduction to infinite series' (Harvard University Publications 1897); Godefroy's 'Théorie élémentaire des séries' (Paris 1903); Runge's 'Theorie und Praxis der Reihen' (Leipzig 1904); Borel's 'Leçons sur les séries à termes positifs' (Paris 1902); Hadamard's 'La série de Taylor' (Paris 1901).

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SERIES, the term applied to the rocks laid down during an epoch. Series is a subdivision of system (q.v.) just as epoch is a subdivision of period (q.v.).

SERIGRAPH, sĕr'ĭ-grȧf (Lat. *sericum,* silk + Gr. *graphein,* to write), an autographic device for testing the strength of raw silk; (2) one of the graphic arts—an adaptation of an ancient Chinese stencil printing method; also a fine print as distinguished from a reproduction produced by the silk screen printing process.

SERIN, *in ornithology,* a finch, *Serinus hortulanus,* which is closely allied to the canary. Its head is olive-gray and the throat and breast are of a bright gamboge-yellow, shading to white on the belly. It is four and one-half inches long. The serin finch is noted as a lively and indefatigable singer. It is migratory and spends the summer and oftentimes the winter in Middle Europe.

SERINGAPATAM, sĕr-ĭng-ga-pa-tăm′ (properly, Sri-ranga-patanam, "city of Vishnu"), India, a celebrated town and fortress, the former capital of Mysore, 245 miles west by south from Madras, on an island formed by two branches of the Kaveri. The fort, a massive structure, stands on the western end of the island and contains within its walls the ruins of the palace of Tippu Saib (q.v.), a mosque built by the same ruler and an old temple. Just outside of the fort is Tippu's graceful summer palace, now in ruins. At the east end of the island, near the suburb of Ganjam, where almost all the inhabitants now reside, is the mausoleum in which Tippu and his father, Hyder Ali, are buried. The fort was three times besieged by the British, first in 1791 and afterward in 1792 and 1799. On the last occasion the fortress was carried by assault, Tippu being slain. The town once contained about 150,000 persons, but its population in course of time has steadily decreased until now it is only about 7,500.

SERINUS, *in ornithology,* a genus of the sparrow family *Fringillidæ* (q.v.), having a stout cone-shaped bill, broad at the base; the nostrils basal, round and hidden by stiff frontal feathers directed forward, gape straight, without bristles. The serinus is small, compact and active; the legs are short and scutelate; the feet strong; the wings which are moderately long and somewhat pointed have a minute outer primary; and the tail is deeply forked. The serin (q.v.), *Serinus hortulanus,* the *S. canonicus,* the *S. canarius,* the canary, and *S. pusillus,* the red-fronted finch, are inhabitants of the Western Palæarctic regions, but some species are to be found in the Eastern Palæarctic, Oriental and Ethiopian regions.

SERIOLA, *in ichthyology,* a genus of *Carangidæ,* divided into 12 species and inhabiting temperate and tropical waters. The body is oblong and slightly compressed, and the abdomen is rounded; the first dorsal fin is continuous, with feeble spine; villiform teeth in jaws and on the vomer and palatine jaws. The smaller species are valueless, but the larger species which range from four to five feet in length are used as food.

SERIPHOS, sĕ-rī′fŏs, or **SERPHO** (now Serphos), Greece, a mountainous island of the Cyclades group, 50 miles south of Eubœa. It contains iron, copper and lead ore — formerly exploited. The products are chiefly corn and wine. The ancient town participated in the battle of Salamis, furnishing the Athenians with several ships. Seriphos was also a place of exile for the Romans. Pop. 4,000.

SERLIO, sār′lē-ō, **Sebastian,** Italian artist: b. Bologna, 6 Sept. 1473; d. Fontainebleau, 1554. He worked as painter and architect at Pesaro for 14 years, leaving that city (1514) for Rome and Venice, where he became Titian's associate. He published at Venice in 1537 his voluminous treatise 'Regole Generale d'Architectura.' He is supposed to have worked with Pierre Lescot on the Louvre. Primaticcio in 1541 was appointed architect at Fontainebleau with Serlio as assistant.

SERNA Y HINOJOSA (lä-sār′nä ē ēn-ō-hō-sä), **José de la,** famous Spanish general: b. Jerez de la Frontera, 1770; d. Cadiz, 1832. He fought in the Peninsular War against the French and served under Wellington in 1813. After working his way up from the ranks to the position of major-general, in 1816 he was placed in command of the Spanish Royalist army in Upper Peru. In this capacity he was in constant conflicts with the natives and numerous uprisings gave him the opportunity to display his military ability. He was, however, defeated by the patriots at Salta and Jujuy, and owing to disagreements with the viceroy in regard to the conduct of the army during the campaign, resigned in 1819, but was at once made lieutenant-general and president of the council of war. Not long after this he was again appointed to the command of the army to suppress the uprising under San Martin, and on 29 Jan. 1821, upon the deposition of the viceroy Pezuela by his officers, he became viceroy. He was not able to stem the tide of San Martin's successes and on 6 July 1821 was forced to evacuate Lima, retreating to Cuzco. From here he directed his army and maintained it for over three years against the patriots without any assistance from Spain, and keeping his ground in the interior with great skill and resolution. He was finally defeated on 9 Dec. 1824 by the patriot leader, General Sucre, in the battle of Ayucucho. Though outnumbered by the Royalists, the patriots won the battle and Serna with his whole army was captured. He was severely wounded during the fight, and was afterward released and sent back to Spain, where he died at the age of 62.

SEROUS MEMBRANE, a delicate glistening tissue of flattened endothelial cells, supported by a fibrous and elastic layer in which are capillaries and lymphatics, that glistens on exposure. The serous membranes of the human body are so called because moistened by a serous fluid, and form closed sacs. For the most part they line certain cavities of the body and are reflected over the surface of the organ or organs contained in the cavities. The portion of the membrane lining the walls of the cavity is known as the parietal portion, the other is the visceral portion. The serous membranes, six in number, are the peritonæum, lining the abdominal cavity and reflected upon the stomach, liver, intestines, etc.; the two pleuræ lining the thoracic or chest cavity, and reflected upon the lungs; the pericardium, a fibro-serous sac covering or enclosing the heart; and the tunica vaginalis, a closed sac surrounding each testicle. In the female, where the ovum passes from the ovary into the Fallopian tube, the peritonæum is not a closed sac. The serous membranes are kept moistened by a watery lymph-like fluid, a variety of serum, which, if secreted in large quantity, as in dropsy, may produce bad results. Lymphatic vessels open freely on the surface of serous membranes, hence they are sometimes spoken of as lymph-sacs and the cavities they line as lymph-cavities. A grave danger arising from injuries and inflammation of serous membranes is the absorption of septic material by the lymphatics. Dropsical effusions, hemorrhage, formation of pus and deposits of fibrous exudations which cause adhesions and prevent mobility of viscera are the principal results of inflammation of these membranes. See Peritoneum.

SEROW, a shaggy goat-antelope (*Nemorrhœdus bubalinus*) of the Himalayas, where it

frequents, singly, or in family parties, the roughest slopes, at an altitude between 6,000 and 12,000 feet. Its habits are similar to those of the goral, Rocky Mountain white goat (qq.v.) and other members of the genus, all of which are called «serows» by some writers. Consult Lydekker, 'The Game Animals of India' (1907).

SERPA PINTO, sar'pä pēn'tō. See PINTO, ALEXANDRE ALBERTO DA ROCHA SERPA.

SERPENT, (1) *in astronomy,* one of the 48 varieties of ancient constellations extending serpent-like through a wide expanse of sky. (2) *In music,* an almost obsolete bass instrument, consisting of a wooden tube, about eight feet long, increasing conically from one inch diameter at the mouth-piece to four inches at the open end, twisted into U-shaped turns, followed by a large circular convolution. This is covered with leather, and has a mouth-piece like a horn or trombone, and keys for the several notes to be produced. The serpent is a transposing instrument, being in B flat, and the part it is to take is, therefore, written a note higher than its real sound. Its compass is three octaves and one note.

SERPENT-CHARMING, an art largely practised in Egypt, India and other Eastern lands; there are allusions to it in the Hebrew sacred books, namely, Ps. lviii, 5, the adder which will not hearken to the voice of charmers; Eccles. x, 11 and Jere. viii, 17; also in some of the Greek and Latin classics. The power of charming the most formidable serpents, as exercised by the snake-charmers, is unquestionable; nor is it true that before making an exhibition of their art the charmers always extract the poison fangs of the creature, though that is often done. Dr. Davy, in his 'Interior of Ceylon,' expresses his belief in the reality of this singular power. «I have examined the snakes,» he writes, «and have found the fangs in and uninjured. These men do possess a charm, though not a supernatural one — namely, that of confidence and courage. . . . They will play their tricks with any hooded snakes (*Naja tripudians*), whether just taken or long in confinement, but with no other kind of poisonous snakes.» The serpent-charmers are sometimes employed to rid gardens of serpents; and they readily recognize when a serpent is concealed anywhere. In practising their art for this purpose, as also in their exhibitions, they employ a kind of flute in aid of their incantations. When the serpents issue from their hiding places the performer secures them by pinning them to the ground with a forked stick. Those familiar with hypnotism and the French fad for hypnotizing chickens, that flourished in Paris early in the 19th century, will easily recognize that serpent-charming is hypnotic in character.

SERPENT-EAGLE, the secretary-bird (q.v.).

SERPENT-HEAD, or **WALKING-FISH,** a fish of the East Indian and African genus *Ophiocephalus,* the type of a family, allied to the climbing perch, and like it able to live a long time out of the water, and to travel by wriggling through moist grass, from one pool to another. The body is elongate, two to three feet long, and covered with medium-sized scales, those on the depressed head being platelike. About 30 species are known, inhabiting many parts of Asia, the commonest being *O. striatus,* which is sometimes found torpid in dried-up pools and irrigation tanks. When living in muddy water they must rise to the surface from time to time to take in air, or they will smother to death. These fishes are eaten throughout the Orient.

SERPENT-WORSHIP, or **OPHIOLATRY,** a primitive form of religion which is still found existing among uncultured races. The serpent's change of skin may well have been suggestive of resurrection and immortality; the more common supposition that the serpent was regarded by his savage worshippers as the personification of evil and of maleficence, and as a power to be appeased by gifts and worship, does not appear to be justified by the reports of travelers, though the Apophis-serpent of the Egyptian Hades, as well as the wicked Aji Dahaka of the Zoroastrians, were undoubtedly worshipped purely through fear. The brazen serpent erected by Moses in the wilderness and afterward preserved until the days of Hezekiah was broken in pieces by that king (2 Kings xviii, 4), the image having been made an object of religious worship; this was apparently a recrudescence of primitive serpent-worship among the people of Judah. The brazen serpent, it is conjectured by Renan ('Hist. Peuple d'Israël I, xi), was a primitive idol of Jahve. In the Biblical narrative Satan assumed the form of a serpent; among the ancient Egyptians, Typhon was the evil deity, and this idea has generally persisted in Asia, and is apparent in the hieroglyphics of both the Chinese and Mexicans. The serpent whose head the Messiah was to crush, in heathen fable became the hydra of Hercules, and in India the great monster over whom Krishna triumphed, while Roman mythology developed the 100-headed snake slain by Jupiter. We see a trace, and more than a trace, of a primitive worship of the serpent in the great serpent which guarded the citadel of Athens and which was fed every month with honey-cakes; also in the embassage from Rome on the occasion of a plague, to the temple of Æsculapius at Epidaurus, whence was brought a living serpent which was received at Rome with great ceremony. Serpent-worship is still extensively practised in India. Among no people has the mystery of this worship weighed more than on the aborigines of America. It has given name to rivers: examples, Kennebec and Antietam. The name for *spirit* and *snake* are one among the Dakotas, the Shawnees and the Sacs. The Ojibways and other aborigines dread to kill a rattlesnake, and if they find one in their path they pray it to go away and spare them and their families. In Mexico sculptured images of serpents are found as large and as carefully wrought as those of India. There is a vast amount of literature on the subject, which covers the folklore of all peoples, and the serpent seems to have been worshipped more than any other creature, and to have been associated with the idea of fertility or fecundity. In many East Indian ceremonies the serpent deities are constantly associated with women; certain priestesses were selected for their purity, and other women were chosen as «wives» of the snake, and participated in licentious rites. The lore

of the serpents is much mixed with dragon literature.

SERPENTINE, sûr'pĕn-tēn, a hydrated magnesium silicate of monoclinic crystallization, corresponding to the formula $H_4Mg_3Si_2O_9$, and closely related to chlorite. It is formed by the hydration of a mixture of olivine and enstatite, or from the combined action of water and carbon dioxide on olivine alone, giving serpentine and magnesium carbonate. Serpentine is found with a variety of different structures—massive, slaty, foliated, and fibrous, the latter being classed as types of asbestos (q.v.). Chrysotile is one of the fibrous varieties, the fibers being strong, fine, flexible, and easily separable. Its luster is silky; the color is pale green, yellow, or brown. It often occurs in veins in massive serpentine. About 95 per cent of commercial asbestos is chrysotile, the value commercially depending upon fiber length. Serpentine is also closely related to talc (q.v.), the general composition of the two being the same, except for a smaller amount of water of hydration in the talc. Williamsite is an applegreen impure variety of serpentine and is sometimes mistaken for jade. It is often cut and polished. Precious, or noble, serpentine is translucent and of a rich green color.

When not too much broken by joints, serpentine may be used as ornamental or building stone, sometimes being known as serpentine marble. Some varieties are highly prized for their rich green, yellow, and brown colors; others are beautifully mottled with red. This color variation is formed by veins of talc, magnesite, iron oxide, and crystals of pyroxenes running through the massive serpentine. Verd antique or ophicalcite is one of the well-known ornamental varieties of serpentine marble. In the United States serpentine is found in Maine, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, California, and Arizona. It is also found in Austria, USSR, Norway, Sweden, Scotland, England, and Germany.

SERPENTS or **SNAKES,** of which nearly 3,000 species are known, form one of the principal groups of living reptiles. Anatomical evidence and the fossil record suggest that they were derived from lizard-like ancestors during the Lower Cretaceous period, approximately one hundred million years ago. Snakes belong to the suborder Serpentes (or Ophidia) and are so closely related to the lizards (Sauria) that the two groups are ranked as suborders of the order Squamata, class Reptilia.

Definition.—Many structures characteristic of snakes are found in some lizards. However, snakes ordinarily may be distinguished from other reptiles in having the two halves of the lower jaw connected only by an elastic ligament; in having lost both the pineal opening on top of the head and the upper (temporal) arch of the cheek; and in having the brain case enclosed at the front. Bones of the jaw usually are attached loosely to the skull in order to provide the greater motility necessary for the swallowing of relatively large prey. All snakes lack movable eyelids, external ear openings, and breast bones. The body is elongate and more or less cylindrical, with as many as 435 vertebrae. Snakes lack functional limbs, even though vestiges may be present.

Environmental Requirements.—Snakes, like all other reptiles, lack any internal mechanism for the maintenance of a constant body temperature. They are able to remain active only when the body can be maintained between approximate limits of 60° and 104°F. (15° to 40°C.). Temperatures somewhat higher than 104°F. and slightly below 32°F. can be tolerated for brief periods. By means of their activities snakes are able to control their body temperature; they bask when sunlight is available, but air and ground temperatures are low, or they become nocturnal when ground temperatures are high. Where marked seasonal changes are the rule, snakes hibernate during the winter, or estivate during periods of prolonged hot or dry weather.

Snakes are found in most parts of the world where the subsoil is not permanently frozen, even within the Arctic Circle in the case of a viper inhabiting the Scandinavian Peninsula. Snakes did not succeed in reaching New Zealand, and failed to reach Ireland following the last glacial epoch, during which the island was too cold for reptiles to survive. Many oceanic islands lack snakes, and none is native to Hawaii, although a small harmless species has been accidentally introduced.

Sensory Capacities.—The vision of snakes is moderately acute in many terrestrial or arboreal species, and objects that stimulate them visually are approached for "investigation." These snakes rely largely upon visual cues in detecting the presence of prey; others depend almost entirely upon olfaction. The sense of smell is well developed; odorous particles are picked up by a protrusible, forked, tongue and carried to chemoreceptors (the organs of Jacobson) in the roof of the mouth. The nostrils lead to olfactory membranes, but these are not so important as the organs of Jacobson. Taste buds are not well distributed in the mouth.

Snakes lack a tympanum, and the columella is attached distally to the quadrate. Hence, snakes do not hear in the ordinary sense of the word, although they are particularly sensitive to vibrations received through the substratum. The organs of touch are relatively important organs in snakes. Many boas, pythons, and all pit vipers are equipped with facial or labial pits, extremely sensitive heat receptors, that permit these snakes to detect the presence of warm-blooded prey, and seemingly serve to direct the strike.

Classification.—Systematists recognize thirteen families of snakes, one of them extinct, and there are additional subfamilies. Nearly all families are represented in southern Asia, which may have been the center of origin and dispersal. The largest snakes of the past, as well as the present, belong to the primitive family, Boidae, with two subfamilies, the boas (Boinae), largely restricted to the New World tropics and subtropics, and the pythons (Pythoninae) of the Old World, except for a single species in Mexico. Vestiges of pelvic bones, and external limbs, often mere spurs, are present in boas and pythons, all of which kill their prey by constriction.

The majority of harmless snakes belong to the family Colubridae, a large assemblage with representatives in nearly all parts of the world. There are several subfamilies: Colubrinae, a widespread, progressive group, including racers, king snakes, and their allies; Xenodontinae, some with rear-fangs, but not dangerous to man, mostly restricted to the southern continents, particularly South America; Natricinae, largely composed of

aquatic harmless snakes found in both hemispheres; Homalopsinae, relatively harmless, rear-fanged fresh-water snakes of southeastern Asia and the Indo-Australian Archipelago; Acrochordinae or "wart snakes" of southeastern Asia and the Malay region; Xenoderminae, with a few forms in the tropics of Asia and America; Dipsadinae, slug-eating snakes of tropical Asia and America; Dasypeltinae, egg-eating snakes, a fangless species in Africa and a rear-fanged species in India; Sibynophiinae, snakes with the dentary (tooth-bearing bone in the lower jaw) attached anteriorly only, with a few representatives in Asia, Central America, and Madagascar.

Derived from the colubrid ancestry, but with immovable tubular fangs at the front of the upper jaw, the family Elapidae is comprised of the venomous coral snakes in the Western Hemisphere, the cobras, mambas, and kraits of the Old World, and several groups in Australia where representatives of the family predominate.

The sea snakes (Hydrophiidae), all of them with flattened tails and valvular nostrils, and venomous, are marine relatives of the cobras that inhabit principally the coasts of southern Asia, Australia, and the adjacent islands; one species has reached the eastern coast of Africa and the west coast of North America, although none is found in the Atlantic.

True vipers (Viperidae) are dangerously venomous snakes found only in Africa and Eurasia. Relatively long, tubular fangs attached to a movable upper jaw lie horizontally in the mouth when at rest, and are swung forward when the snakes strike. The common vipers of Europe are relatively small, but the Gaboon viper of Africa may reach a length of six feet, with fangs nearly two inches long. The family is composed of terrestrial, arboreal, and even burrowing forms.

Pit vipers (Crotalidae), similar to the vipers, but equipped with facial pits, include most of the well known venomous snakes in the Western Hemisphere, and there are a few species in Asia and Eastern Europe. Rattlesnakes are especially characteristic of North America, whereas the fer-de-lance and its relatives (of the genus *Bothrops*) are typical of South and Central America. The bushmaster, which may exceed 12 feet in length, the moccasin, and copperhead are also pit vipers.

Families of less importance, mostly specialized burrowers that retain some primitive characters, are the worm snakes (Leptotyphlopidae), found principally in Africa and the Americas, the blind snakes (Typhlopidae), which are circumtropical, the pipe snakes (Anilidae) of tropical Asia and South America, the rough tails (Uropeltidae) of peninsular India and Ceylon, and the Xenopeltidae, represented by a single species in southeastern Asia. The eye is reduced or even vestigial in most burrowers.

Size and Longevity.—Although the extinct snake, Gigantophis of the Eocene of Egypt is estimated to have attained a length of 50 feet, it is doubtful whether the snakes of the past greatly exceeded living forms in size. The reticulated python rarely reaches a length of 32 feet, and sizes exceeding 20 feet are reached by a few others, including the anaconda of South America, which may attain a length of possibly 28 feet. The same snake holds the longevity record, one anaconda having survived for 29 years in captivity. Others have lived for 20 years or more, although it is doubtful whether snakes often survive so long in nature, where they are subject to parasitical diseases and to predation by various birds and mammals. Snakes often eat other snakes, and they are preyed upon by birds, lizards, crocodilians, and even frogs and fish.

Habits and Place in Nature.—Snakes are not gregarious although a few kinds, notably rattlesnakes, aggregate during the winter months in dens or places of concealment where frost does not penetrate. In temperate zones mating is in the spring, but in warmer regions it occurs during any month. Fertilization is internal, the male being provided with paired copulatory organs (hemipenes) that are withdrawn into the base of the tail when not in use. Incubation requires from forty days to over three months; the length of time is partly dependent upon temperature, and varies with individual species.

Many snakes lay eggs, but others are ovoviviparous, retaining the eggs in the body until they are ready to hatch; placenta-like structures are reported for the anaconda. A few oviparous snakes (pythons and some pit vipers) remain coiled about their eggs until they hatch, but parental care is unknown. Myths concerning "snakes swallowing their young for protection," arise from faulty observation.

Propulsion is accomplished more often by sinuous movements of the body, but rectilinear locomotion, involving movements of the broad scales on the belly and muscular action between the skin and the bony skeleton, is characteristic of many thick-bodied venomous snakes. Snakes may also travel by alternately drawing up the body in a series of coils, and then straightening the body. A more specialized type of locomotion, adapted for moving over flat, sandy terrain, is called sidewinding. A sidewinder (or horned rattlesnake) literally rolls along as a sort of modified helix, each point on the body passing through an S-shaped path above the ground, as the body is transferred from one track to the next.

All snakes are carnivorous. Very small snakes eat insects or spiders, larger snakes devour mammals or birds. Those that eat arthropods, mollusks, or other small animals, seize the prey and swallow it while it is still alive, whereas many common snakes subdue their prey by constriction. The muscular coils of the snake are progressively tightened until the creature to be swallowed dies of suffocation. Snakes that have fangs kill the animals they eat by injecting venom through their paired, tubular teeth.

By virtue of their ectothermic (cold-blooded) metabolism, snakes consume relatively small amounts of food in proportion to their bulk. The bare existence of a snake at a temperature of 70°F. requires approximately one fortieth of the energy of a man reckoned for the same surface. Consequently snakes are able to fast for long periods. A large python is known to have survived without feeding for nearly four years.

Large snakes are able to prey upon animals as large as swine and small deer, but the role of the snake in nature is principally that of a predator on small animals. Some, including the bull snakes of the American prairies, and the rattlesnake of the same region, are of importance in rodent control. Approximately one fifth of the species known to science are dangerously venomous; Australia is the only continent where venomous forms outnumber the harmless species. See also REPTILES.

SERPENTS: (1) Bull Snake or Yellow Gopher Snake (*Pituophis catenifer sayi*), nonpoisonous (n.p.), average length 5 feet. (2) Western Ring-necked Snake (*Diadophis amabilis modestus*), n.p., 16 inches. (3) Gray Rat Snake (*Elaphe obsoleta confinis*), n.p., 4 feet. (4) Striped Whipsnake (*Masticophis taeniatus taeniatus*), n.p., 3½-4 feet. (5) Mud Snake (*Farancia abacura abacura*), n.p., 4 feet. (6) Hog-nosed Snake or Puff Adder (*Heterodon platyrhinos platyrhinos*), n.p., 24 inches. (7) Common Water Snake (*Natrix sipedon sipedon*), n.p., 30 inches. (8) Milk Snake (*Lampropeltis doliata triangulum*), n.p., 30 inches. (9) Eastern Copperhead (*Agkistrodon contortrix mokesen*), poisonous, p., 30 inches. (10) Western Diamond Rattlesnake (*Crotalus atrox*), p., 4½ feet. (11) Pigmy Rattlesnake (*Sistrurus miliarius streckeri*), p., 18 inches. (12) Fer-de-lance (*Bothrops atrox*), p., 4-5 feet. (13) Eastern Coral Snake (*Micrurus fulvius fulvius*), p., 30 inches.

SERPENTS

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(1) De Kay's snake or brown snake (*Storeria dekayi*), nonpoisonous (n.p.), average length 10 inches. (2) Scarlet snake or false coral snake (*Cemophora coccinea*), n.p., 16 inches. (3) Prairie rattlesnake (*Crotalus viridis viridis*), poisonous (p.), 3 feet. (4) Pacific rattlesnake (*Crotalus viridis oreganus*), p., 3 feet. (5) Western ribbon snake (*Thamnophis sauritus proximus*), n.p., 2 feet. (6) Arizona lyre snake (*Trimorphodon lambda*), n.p., 3 feet. (7) Blacksnake (*Coluber constrictor constrictor*), n.p., 4 feet. (8) Cottonmouth or water moccasin (*Agkistrodon piscivorus*), p., 3 feet. (9) Sidewinder or horned rattlesnake (*Crotalus cerastes*), p., 2 feet. (10) Common Eastern king snake (*Lampropeltis getulus getulus*), n.p., 3½ feet.

Photographs from (1-4, 7-10) Zoological Society of Philadelphia and (5, 6) The American Museum of Natural History, New York

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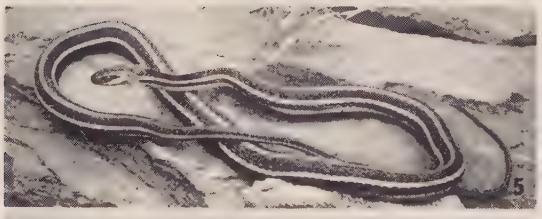

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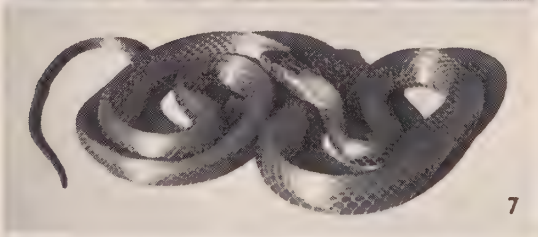

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SERPUKHOV, sĕr-poo-hŏf', or **SERPUCHOW**, Russia, a town in the province of Moscow, on the Nara River, 57 miles southwest of the city of Moscow, comprising three divisions. One of these, the Fort, is enclosed by walls, now in ruins. An ancient cathedral is the only building worth noting. Agriculture is an important industry, and there are manufactures of wool, cotton, leather, paper, chemicals, etc. An active trade with the interior is carried on, especially over the Oka River.

SERPULA, a tube-making marine chaetopod worm (see CHAETOPODA), which often lives and reproduces its tubes in such close proximity over considerable areas as to form, with the cemented fragments of coral, sea shells, sand, etc.; caught among its entwined tubes may be large masses of rock. Such are to be seen on the coast of Florida.

SERRA DA ESTRELLA, sär'rä dä ĕs-träl'yä, Portugal, in the Province of Beira, is the highest range of the country, attaining an altitude of 6,540 feet. It belongs to the Guadarramas system, and is a continuation of the Gata Range in Spain, terminating in the Serra de Lousão. Numerous lakes, some of which are warm, occur in the ridge, and the rivers Condicira and Unhaes form fine cascades.

SERRA DO MAR, doo mär, a coastal range of mountains running east by north from São Paulo, Brazil.

SERRANIDAE, a family of acanthropterygian bony fishes typified by the sea bass (q.v.). The body is generally rather short and heavy, slightly compressed, with moderate or large head and covered with usually ctenoid scales. The mouth is usually large and is provided with numerous teeth all of one kind arranged in broad bands on the vomer and palatine bones as well as on the jaws. The fins are well developed and the dorsal spines usually large and strong but variable in number. Sometimes the dorsal and caudal fins are furnished with filaments or streamerlike appendages. The swimbladder is usually comparatively small and attached to the body walls. This is a large family of carnivorous fishes, including about 70 genera and more than 400 species, almost all of which are marine and especially abundant in tropical waters. They are closely related to the Percidae and, like that family, include a large number of valuable food fishes. In North American waters no less than 28 genera and 90 species are found, almost all of which are good and a number very important food fishes. Among them may be mentioned, in addition to the sea bass, the striped bass, white perch, yellow bass, jewfish, groupers and squirrelfish, most of which are described elsewhere in this work.

SERRANO Y DOMINGUEZ, sĕr-rä'nō ē dō-mēn'gāth, **Francisco**, DUKE DE LA TORRE, Spanish statesman: b. Anjonilla, Andalusia, Sept. 18, 1810; d. Madrid, Spain, Nov. 26, 1885. He entered the military college in 1822, became an ensign in 1825 and served in the coast guard until 1833, but after the death of Ferdinand VII he gained favor with Queen Isabella and espoused the cause of the child queen Isabella II, against the Carlists. He played an active part in the troublous politics of Isabella's reign, at times holding high offices in the administration and again at variance with the ministry. For implication in the insurrection of Saragossa in 1854 he was exiled but in June returned and took part in the successful revolution of Espartero and O'Donnell. In 1857 he was sent as ambassador to Paris, and in 1860 he went to Cuba as captain general. In 1866, after the overthrow of O'Donnell's government, Serrano was banished, but in 1868 returned, assisted in overthrowing the queen's army and forced her to leave the country. He then acted as regent until the accession of Amadeus of Savoy in 1870. He was successful in his warfare against the Carlists both in 1872 and in 1874, and during much of the latter year was at the head of the government. He resigned the monarchy into the hands of Alfonso XII, in 1875, but continued active in political life, and in 1883 was appointed ambassador to France.

SERRELL, Edward Wellmann, American civil and military engineer: b. Nov. 5, 1826; d. New York City, April 25, 1906. He entered the engineering profession and was employed on the Erie Railroad, the Central Railroad of New Jersey, the Panama survey, the Niagara Bridge, the Hoosac Tunnel and other large engineering works. He was an assistant to the chief of topographical engineers, United States of America; entered the Federal engineer corps as a colonel in the Civil War; was at the capture of Fort Wagner and devised the Swamp Angel battery that shelled Charleston, S. C. He became chief engineer for the Department of the South, and was in 126 actions, being brevetted brigadier general. He suggested improvements in guns and gun carriages, and issued some 50 reports on railroads and bridges.

SERRES, Dominic, English marine artist: b. Auch, Gascony, 1722; d. London, 1793. He is said to have been a nephew of the archbishop of Rheims and was intended for the church, but this not suiting his taste he ran away from home and became a sailor, eventually becoming master of a Spanish trading vessel. Being taken prisoner by a British warship, he was carried to England, where he afterward resided. Having had some instruction in drawing, he began life in his adopted country as a painter of naval pieces, for which the wars of the period furnished subjects. Serres became a member of the Incorporated Society of Artists in 1765 and exhibited with them for two years. On the establishment of the Royal Academy in 1768 he was chosen one of the foundation members. Among the pictures exhibited by Serres at the

Royal Academy were *The Siege of Fort Royal, Martinique* (1769), and *The Engagement between the Serapis and the Countess of Scarborough with Paul Jones and his Squadron* (1780). In 1792 he was appointed librarian to the academy, and also marine painter to George III.

SERTORIUS, sûr-tō′rĭ-ŭs, **Quintus,** Roman general: b. Nursia, Italy, about 123 B.C.; d. 72 B.C. He distinguished himself as a soldier under Gaius Marius against the Teutones and later in Spain, and held the office of quaestor in Cisalpine Gaul in 91 B.C. During the civil war between Marius and L. Cornelius Sulla, Sertorius declared for the democratic party and aided Marius in seizing Rome. As Marius' representative he went to Hither Spain in 83 or 82 B.C., and drove out Sulla's governor, but was himself driven out of Spain into Mauretania in 81 B.C. Here he successfully resisted efforts to dislodge him and in 80, at the invitation of the Lusitanians, went to Farther Spain, where his personal bravery, rude eloquence, and generous treatment of the natives won him a large following among natives and Romans alike. Marcus Perperna brought him reinforcements in 77 B.C., and in 77–76 he gained control of most of Spain. Sertorius organized an independent government on the Roman model, headed by a Senate of 300 members, and founded a school at Osca (now Huesca) in which the sons of native chiefs were educated in the Roman fashion. He formed alliances with the Mediterranean pirates and with Mithridates VI, king of Pontus in far-off Asia Minor. These proved ineffective, but despite the greater forces at the disposal of the senatorial party in Rome and the arrival in Spain (77 B.C.) of a formidable expedition led by Pompey the Great, Sertorius, though suffering occasional defeats, maintained his position by guerrilla warfare until jealousy among his subordinates caused his murder in 72 B.C., seemingly at the instigation of Perperna, who was quickly defeated and executed by Pompey.

SERUM THERAPY. See VACCINE.

SERVAL, sûr′văl (*Felis serval*), one of the most common cats of the African plains. It has spotted tawny fur and may exceed three feet in length, besides 15 inches of tail. Servals are voracious feeders, hunting small mammals or birds on the ground, and often digging rodents out of their burrows. They are capable of climbing trees as well. Servals are active both by day and night.

Consult Bourlière, François, *Mammals of the World* (New York 1955).

EDWARD HODGSON.

SERVANTS OF MARY. See ORDERS, RELIGIOUS—*Roman Catholic Orders* (Servites).

SERVETUS, sûr-vē′tŭs, **Michael** (Span. MIGUEL SERVETO), Spanish physician and theologian: b. Tudela, Navarre, 1511; d. Geneva, Oct. 27, 1553. He was the son of a notary, who sent him to Toulouse to study civil law. Here Servetus became interested in the discussions of the Reformers and began to devote his attention to theology. Subsequently he found his way to Germany and there printed a strongly anti-Trinitarian tract, *De trinitatis erroribus* (1531), which was followed the next year by *De trinitate.* But he found that the expression of his opinions, which finally came to include a denial of infant baptism and of original sin, was as obnoxious to the Reformers as to the orthodox, and he made his escape to France under the name of Michel de Villeneuve. After being employed as a proofreader by the Frellons, publishers at Lyon, Servetus went to Paris in 1536, where he studied medicine and graduated as doctor. In Paris he seems to have encountered John Calvin for the first time. Having quarreled with the medical faculty at Paris, he left that city (1538), studied theology and Hebrew at Louvain, and practiced medicine at Avignon and Charlieu. He continued his medical studies in the school of Montpellier and in 1541 settled at Vienne, becoming physician to the archbishop.

In 1553 Servetus published his matured theological system anonymously under the title of *Christianismi restitutio.* The magistrates of Vienne, however, discovered the name of the author—according to some authorities, with the help of Calvin—and Servetus was tried and convicted of heresy, but managed to escape from prison. He set out for Italy, but some fatal fascination made him go by way of Geneva, where he arrived on Aug. 13, 1553. On the following day he was arrested by the magistrates on a charge of blasphemy and heresy. His writings were sifted for accusations, but the magistrates of Geneva were aware that this was extraordinary treatment of a person who was neither subject nor resident but properly speaking a traveler kidnaped in his passage. They therefore consulted the magistrates of all the Protestant Swiss cantons, who referred the matter to their divines. The latter unanimously declared for punishment, Calvin being especially urgent and emphatic on the necessity for putting Servetus to death. Indeed Calvin had indicated earlier that if Servetus came to Geneva, he would do his best to prevent him from leaving alive. As Servetus refused to retract his opinions, he was condemned on Oct. 26, 1553, and the next day burned as a heretic. Servetus is renowned in medical history as the first to discover the pulmonary circulation of the blood.

SERVICE, sûr′vĭs, **Robert William,** Anglo-Canadian writer: b. Preston, England, Jan. 16, 1874. Service grew up in Scotland and went to school in Glasgow. In 1888 he became a bank clerk, but tiring of the routine, emigrated to Canada, reaching Vancouver Island in 1894. He then traveled up and down the Pacific coast working at various jobs until 1905 when he joined the Canadian Bank of Commerce at Victoria. He was later transferred to Whitehorse and Dawson in the Yukon, resigning in 1909. Service spent eight years in the Yukon, traveling extensively in the subarctic region and becoming widely known for his ballads and other verse depicting frontier life in the Far North in a manner reminiscent of Rudyard Kipling. Subsequently he reported the Balkan War of 1912–1913 for the Toronto *Star.* During the early part of World War I he served as a Red Cross ambulance driver, later joining the Canadian Army. After the war he settled in southern France. He left France for Canada during the German invasion of World War II, but later returned.

Perhaps his best-known ballad is "The Shooting of Dan McGrew," which appeared in his first

book, *Songs of a Sourdough* (1907, reprinted as *The Spell of the Yukon* in 1908). Other books of verse are *Ballads of a Cheechako* (1909); *Rhymes of a Rolling Stone* (1912); *Rhymes of a Red Cross Man* (1917); *Ballads of a Bohemian* (1920); *Songs of a Sun-Lover* (1949); *Rhymes of a Roughneck* (1950); *Lyrics of a Low Brow* (1951); and *Rhymes of a Rebel* (1952). His novels, such as *The Pretender* (1914), *The Roughneck* (1923), and *The House of Fear* (1927), are less well known. *Ploughman of the Moon* (1945) and *Harper of Heaven* (1948) are autobiographical.

SERVICE TREE, *Sorbus domestica,* a member of the rose family (Rosaceae), is native to southern Europe, North Africa, and Asia Minor, and cultivated in the United States. It is larger (to 60 feet tall) than its close relative, the European mountain ash or rowan (*S. aucuparia*), which it resembles in habit. The service tree has spreading branches and a rough, scaling bark. It bears pinnately compound leaves (to 9 inches long) consisting of 11 to 21 narrow-oblong leaflets (to 3 inches long) and white flowers (one half inch across) grouped in tomentose panicles four inches long. Its pear-shaped (var. *pyrifera*) or apple-shaped (var. *pomifera*), somewhat acid fruits are about one inch long, green or brown, and contain grit-cells in their flesh. They are sometimes eaten only when partially rotten (bletted).

SERVICEBERRY. See AMELANCHIER.

SERVITES. See ORDERS, RELIGIOUS—*Roman Catholic Orders* (Orders of Men).

SERVITUDE, *in general usage,* the state or condition of a serf, slave, or bondman; or the state of voluntary or involuntary subjection to a master or employer.

In law, particularly in Roman or civil law, it denotes a charge on property for the benefit of a person or another property. The servitude is either affirmative, obliging the owner of the property to do some act, such as to permit water to be led from his land; or negative, preventing the owner from doing certain acts, such as building walls beyond a certain height or blocking up a window.

SERVIUS, sûr'vĭ-ŭs (in full SERVIUS MARIUS HONORATUS or SERVIUS MAURUS HONORATUS), Latin grammarian: fl. late 4th century A.D. One of the most learned of the classical grammarians, he is known chiefly for his commentary on *The Aeneid, Georgics,* and *Eclogues* of Virgil, which has come down to us in two versions. The longer version was formerly thought to have been enlarged by an unknown author of the 7th or 8th century, but modern scholarship attributes the additions to a work of Aelius Donatus which Servius used in part for his commentary. Servius was also the author of other grammatical works as well as of a commentary on Donatus' *Ars grammatica.*

SERVIUS TULLIUS, sûr'vĭ-ŭs tŭl'ĭ-ŭs, sixth king of Rome: d. 534 B.C. Although the traditional accounts of the Roman monarchy that have come down to us are generally legendary, Servius is almost certainly an actual historical personage. He does not seem to have been an Etruscan, as one account has it, but a Roman or Latin who married the daughter of the fifth king, Lucius Tarquinius Priscus, and succeeded to the throne on the latter's death (the traditional date is 578 B.C.). His reign is said to have been peaceful and to have been marked by constitutional reforms and material progress. The so-called Servian Reform, by which the plebeians were admitted to the Comitia centuriata, probably did not develop until the 5th or 4th century, and the wall which bears his name was not built until 378 B.C. Nevertheless, Servius did conclude the treaty with the Latin League ascribed to him, and he seems to have erected public buildings in Rome. He is said to have been killed in a patrician conspiracy.

SERVOMECHANISM, sûr-vô-mĕk'ă-nĭz'm (also called FEEDBACK CONTROL SYSTEM). Servomechanisms are automatic control systems in which the operation of a high-power device, as one used in pointing a gun or positioning the rolls of a steel mill, is caused to follow closely the command of a low-power device. The high-power and low-power devices are usually remote from one another. The ratio of the power controlled to the power in the control signal may often be a million million to one.

Servomechanisms, or robots as they are often called, are important in manufacturing such necessities as steel, machine tools, and chemicals, in steering ships, aircraft, or guided missiles, in printing colored magazines, in scientific research, and have numerous other applications. They are applied daily to operations that man finds difficult or unpleasant. In response to a signal no greater than the twitch of a muscle, they control great masses. In many of the world's great observatories the light from a star is made to control the motion of a massive telescope to an accuracy of a few wavelengths of light.

The high-power device is called the *controlled member,* and the quantity being controlled is usually its position or speed. The low-power device is called the *command* or reference, and the command signal may also be position or speed. Often, however, the command is the voltage from a radar echo or from a pressure-sensing device, or even the intensity of incident light.

Servomechanisms have an important property that distinguishes them as a class from many automatic control systems, in that the explicit operation of the high-power device is made a function of the *difference* or error between its desired state, or command, and its existing state. In all servomechanisms, the requirements of the command are constantly or intermittently compared with the state of the control, and if there is an error, an adjustment is made.

It is this error-sensing property of servomechanisms that makes possible their remarkably high operating accuracy under widely diverse operating conditions, and it is the means by which this property is achieved that has given rise to the widespread use of the term *feedback control system.* In all servomechanisms, the condition of the output is fed back for comparison with the command, to provide information about the difference or error. The error information is used as a signal to actuate the power-amplifying part of the system and to bring about the desired amount of control. All servomechanisms therefore comprise: (1) a means of measuring what is desired and what is being accomplished; (2) a means of transmitting these measurements

between the remotely located command and the control, and for establishing their difference; and (3) means of amplifying the difference signals and using them to control large amounts of power. The error-sensing and amplifying part of the system is often referred to as the brain or nerve center. Because of their wide diversity of applications, servomechanisms frequently comprise electrical, electronic, hydraulic, mechanical, pneumatic, optical, and thermal components, both singly and in combination.

The principle of feedback is readily understood by reference to an example from everyday life. Consider the situation in a schoolroom. Here the textbook may be thought of as the command. The teacher may be thought of as the nerve center, the student as the controlled member. This situation is depicted in Fig. 1. The quantity being controlled is the student's depth of understanding of the textbook. If the educational process were limited to having the teacher expound on the text while the student merely listened, we would not expect much learning because the teacher would have no means of knowing whether the student really understood or whether what was said was relevant to the learning process. It is for this reason that education makes use of the test or quiz. The teacher receives "feedback" by means of the quiz, which meas-

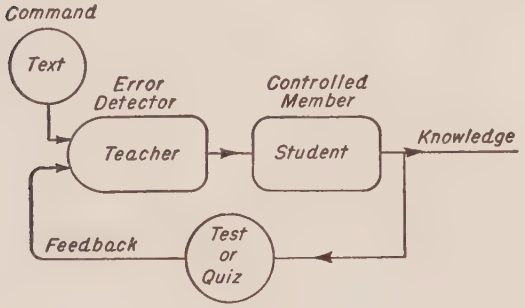

Fig. 1. Diagram of feedback in the schoolroom.

ures how well the student understands. If there is an error in understanding, the teacher can make an adjustment. As a matter of fact, in our daily actions, we frequently operate in exactly the same manner as do servomechanisms—as systems in which the control action is a function of the difference between the state desired and the state existing, this difference being available by feedback from the controlled element to the nerve center of the system.

Fig. 2 illustrates an arrangement of equipment in antiaircraft weapons, where a radar set automatically tracks a target airplane and furnishes information about the target position to a director, which computes where the gun should point so that the projectile and the target will collide after the projectile has travelled the necessary distance. The power servomechanism drives the gun by comparing the actual gun position with the gun position computed by the director and uses the error to actuate the power drive of the gun. Servomechanisms employing the principles shown for the gun occur also in several other places in the director and the radar set, but for simplicity of description are not shown in the figure.

The designers of servomechanisms face many problems when synthesizing the elements that are to go into the system. In aircraft applications,

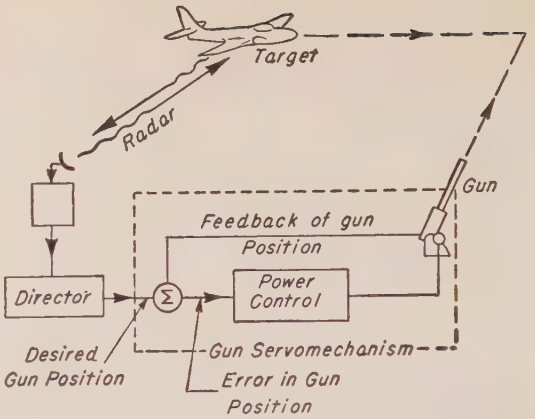

Fig. 2. Antiaircraft gun servomechanism for positioning gun.

their scope is severely restricted by the necessity of combining reliability of operation with compactness in design. The same equipment must operate reliably both on the ground at temperatures ranging anywhere from −40°F. to 120°F. and at altitudes of some 60,000 feet, the temperature range may be even greater. Industrial applications can often tolerate bulkier and heavier equipment, but it must be no less reliable and must often cope with the hazards of contaminated or explosive atmospheres and stand a lot of abuse. Advances in the engineering art have been rapid since the end of World War II and many truly remarkable systems have been evolved.

The performance demanded of servomechanisms also taxes the ingenuity and creative resources of designers. The task is invariably one of designing equipment that will hold a close correspondence between control and command in the presence of widely varying loads and rapidly changing commands. Unless careful attention is paid to the mathematical theory of feedback systems, the performance will tend to become oscillatory or the system will "hunt" as the engineer attempts to reduce the operating errors. Furthermore, servomechanisms theory stipulates this essential law of control for any servomechanism: in the presence of any steady error, the controlled quantity must be the time derivative of the error, that is, in a position control system a steady position error must establish a velocity of the output. Systems in which a steady position error establishes only position at the output are elementary governors or regulators, not servomechanisms.

The crux of the design problem is finding the dynamic behavior of each component in the system. Following the techniques of communications engineering, the so-called frequency-response method of analysis and synthesis is now in wide use. When the parameters of such components as mass, friction, elastance, and sensitivity are known, the frequency-response function can be readily calculated. But in many instances the components are so complicated that experimental methods of measurement must be devised for determining the characteristics. Briefly, the procedure is to energize the components, either singly or as assemblies, with a time-varying sinusoidal signal as shown by curve *A* in Fig. 3. The magnitude and the relative phase of the output response with respect to the constant-magnitude excitation are then measured as the excitation frequency is varied. Curves *B* and *C* show the time-varying excitation and response relations

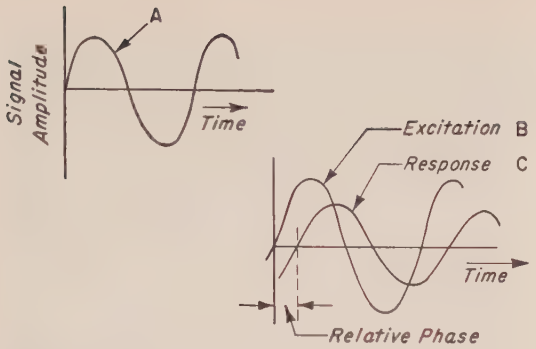

Fig. 3. Time varying (sinusoidal) signal-response relationships.

for a particular frequency. Data as in Fig. 3, for an octave of frequencies above and below the approximate resonant frequency of the system, provide very useful information; from an analysis of such data, a designer skilled in servomechanisms theory can determine the essential design factors, such as gear ratios, amplifier sensitivities, motor or generator sizes, or hydraulic pressures, as the case may be. He may also elect to introduce compensating networks into the system in order to give the required dynamic performance.

For many applications, the design is a compromise, where acceptable accuracy is achieved at a

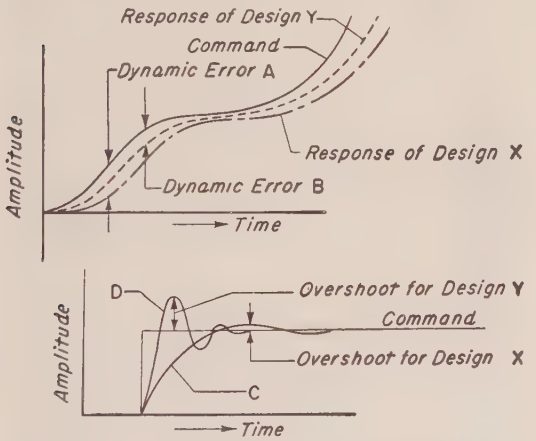

Fig. 4. Showing dynamic error and relative stability.

desirable degree of stability. For example, for a typical time variation of command, design *X* may yield a certain operating error, such as curve *A* in Fig. 4, with a degree of stability for a sudden change in command indicated by the overshoot of curve *C*. Alternatively, design *Y* may yield a smaller operating error, as in curve *B*, for the reduced degree of stability shown by curve *D*. The many factors which influence the design compromise can be evaluated only by competent engineers who have had long and extensive experience with servomechanisms.

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SESAME, sĕs'ă-mē, a rough, hairy, gummy annual plant (*Sesamum indicum*) about two feet high, with petiolate, ovate-lanceolate leaves, opposite below and alternate above, slightly toothed, and mucilaginous. The flowers are solitary in the axils, pale or rose-colored, five-parted, with irregular-lipped corolla, having the tube curved downward and dilated above the oblique base. Sesame has been known from ancient times and originated in the East, where it is cultivated for the sake of its black or white seeds. It is easily grown, does not object to poor soil, and has even been introduced to gardens in America. The plant has run wild in the Southern states.

The seeds are very tiny, but sweet and oleaginous, and are used for food by Oriental peoples

Sesame (*Sesamum indicum*) with detail of fruit.

and imported into Europe for crushing. They will yield half of their weight in oil, which is yellow, limpid, inodorous, and keeps for years without becoming rancid. It is of great economic value, second only to coconut oil in the variety of its uses, and can be employed instead of olive oil in many ways, as for culinary purposes, food, medicine (having a laxative effect), cosmetics, and soaps. It is also employed as an adulterant in olive oil, and may itself be adulterated with peanut oil. Sesame oil is also known as benne, gingelly or gingili, and teel or til. The cake left after the oil has been expressed makes a good feed for cattle and is sometimes food for the poor.

SESAMOID BONES, sĕs'ă-moid, rounded bodies, at first cartilaginous and then bony, found in the tendons of muscles. They derive their name from their resemblance to sesame. The patella or kneecap is a sesamoid bone. Another is developed in the upper joint of the thumb, and at the corresponding joint of the great toe, these increasing the leverage of the short flexor muscles of the thumb and great toe respectively. Sesamoid bones are far less numerous in man than in most mammals.

SESOSTRIS, sē-sŏs'trĭs (Greek corruption of the Egyptian Senusret, sĕn-ŭs'rĕt, Senusrit, sĕn-ŭs'rĭt, or Senusert, sĕn-o͞o'sĕrt), the name of three ancient Egyptian kings of the 12th dynasty.

Vigorous rulers who suppressed the power of the provincial nobility, they extended their domain southward in the Nile Valley, but made no major expeditions into Asia.

Sesostris is also the name of a legendary Egyptian king, the story of whose conquest of a vast area Herodotus (Book II) says he got from Egyptian priests. This king apparently is a composite of Rameses II and other rulers, including perhaps the historical Sesostris III.

Sesostris I, second king of the 12th dynasty, reigned for about 44 years, approximately from 1971 to 1928 B.C., after 10 years as coregent with his father, Amenemhet I, the dynasty's founder. As coregent the son seems to have led expeditions against the Nubians and Lybians, after his father's death completing the conquest of Nubia and invading Cush. His pyramid, like his father's, was built at El Lisht, near the capital Amenemhet I had founded to replace Thebes. Sesostris I was succeeded by his son Amenemhet II. An early example of narrative fiction, *The Romance of Prince Sinuhe*, is placed in this period, relating Sinuhe's flight at the death of Amenemhet I, his life in exile, and his return to Egypt late in the reign of Sesostris I.

Sesostris II, fourth king of the dynasty, reigned for about 19 years, approximately from 1897 to 1879 B.C., after three years as coregent with his father, Amenemhet II. His pyramid was built at El Lahun (Illahun).

Sesostris III, son of Sesostris II and fifth king of the dynasty, reigned for some 36 years, approximately from 1878 to 1843 B.C. He had a canal dug through the first cataract of the Nile, campaigned in Nubia, and extended the boundaries of Egypt southward beyond the second cataract, erecting two boundary stele at Semneh, on the Nile, about 35 miles southwest of Wadi Halfa. His pyramid was built at Dahshûr. He was succeeded by his son Amenemhet III.

SESQUICENTENNIAL EXPOSITION, sĕs-kwĭ-sĕn-tĕn'ĭ-ăl, an exposition held at Philadelphia, Pa., from June 1 to Nov. 30, 1926, to commemorate the 150th anniversary of the signing of the Declaration of Independence. Among the outstanding buildings were the Palace of Liberal Arts and Manufactures, and the Palace of Agriculture and Food Products. From the patriotic standpoint, the exposition achieved its purpose, but financially it was not a success, and the city of Philadelphia had to issue bonds to cover bills aggregating $5 million. The total cost was estimated at $18 million. The attendance was about 6 million.

SESTERTIUS, sĕs-tûr'shĭ-ŭs, or **SESTERCE,** sĕs'tûrs, an ancient Roman coin worth 2½ asses. Originally it was of silver, but from the time of Augustus it was brass. The sestertius was the fourth part of a denarius, and when in later times the weight of the as was reduced, and 16 asses were reckoned to a denarius, the sestertius still retained the same proportion to the latter coin, and thus became equal to four asses. The value of the sestertius, therefore, varied with that of the denarius. About the close of the republican period, when the denarius is calculated to have been worth about 17 cents, the sestertius would be worth 5 cents.

The sestertius was the unit most commonly employed by the Romans in reckoning large sums of money. For sums below 1,000,000 sestertia, the ordinary cardinal numerals were used with sestertii or sestertia, as the case might be: but if the sum amounted to 1,000,000 or more, a numeral in *ies*, after which *centena millia* (100,000) had to be understood, was connected with sestertium (for example, *quadragies sestertium* is 4,000,000 of sestertii, that is, *quadragies centena millia sestertiorum nummorum*). Sometimes the numeral adverb was used alone, and *decies ei dedit* signifies *decies sestertium*, that is, *decies centena millia sestertiorum*, or 1,000,000. The sestertius was often expressed by the symbol HS, which is explained as a corruption of IIS, that is, II, the Roman numeral two, and S for *semis*, half.

SESTINA, sĕs-tē'nà, an extremely intricate form of verse invented by Arnaud Daniel, a Provençal troubadour, toward the end of the 12th century, and adopted by Spanish, Portuguese, and Italian poets, notably Dante Alighieri and Petrarch. It consists of six six-line stanzas; the last word of each line of the first stanza is repeated as the last word of a line in each succeeding stanza, but in different order. Provençal poets set the rhyme scheme as follows: first stanza, 1,2,3,4,5,6; second, 6,1,5,2,4,3; third, 3,6,4,1,2,5; fourth, 5,3,2,6,1,4; fifth, 4,5,1,3,6,2; sixth, 2,4,6,5,3,1. After the sixth stanza there is a three-line envoy in which the six rhyme words are repeated, three at the end of the lines and three in the middle. It will be noted that in each stanza after the first, the first line ends with the same word as the last line of the preceding stanza, and the second line ends with the same word as the first line of the preceding stanza.

In France, the form was revived by the *Pléiade* poets, notably Pontus de Thiard in the 16th century, and it was used extensively by Comte Ferdinand de Gramont in the 19th century. In Germany it was adopted by various 17th and 19th century poets. Sir Edmund William Gosse awakened interest in the sestina among modern English poets in 1877, and Algernon Charles Swinburne employed it with remarkable success in later decades. Ezra Pound and W. H. Auden are among 20th century poets who have utilized this intricate verse form.

SESTINI, sĕs-tē'nĭ, **Benedict,** Roman Catholic clergyman, mathematician, and astronomer: b. Florence, Italy, March 20, 1816; d. Frederick, Md., Jan. 17, 1890. He was ordained in 1844 and taught higher mathematics at the Roman College until the Revolution of 1848 forced his flight from Rome. He arrived in the United States the same year and entered Georgetown University, where he taught mathematics. In 1869 he transferred to the Jesuit Seminary at Woodstock, Md., continuing to teach mathematics until 1884, when he retired to Frederick. In addition to mathematical treatises, his chief work in astronomy is *Catalogue of Star-Colors* (1845 and 1847).

SESTIUS, sĕs'chĭ-ŭs, or **SEXTIUS,** sĕks'-tĭ-ŭs, **Publius,** Roman politician. In 63 B.C., as quaestor, he helped Cicero suppress the conspiracy of Catiline. He became a tribune in 57 and was active in recalling Cicero from banishment. Accused the following year of using illegal force, he was defended by Cicero in an oration still extant, and with the powerful support of Pompey was acquitted. In 53 Sestius became a praetor. During the civil war of 49 he sided at first with Pompey, then joined Caesar.

SESTOS, sĕs'tŏs, ruined town, Turkey in Europe, on the Thracian shore of the Dardanelles (Hellespont), at the strait's narrowest point

opposite the ancient town of Abydos in Asia Minor. The site is just northeast of the modern Turkish town of Eceabat. It was the invasion point for Xerxes I in 480 B.C. when he crossed the Dardanelles with his army over a bridge of boats and marched through Thrace, Macedonia and Thessaly. Sestos also is the scene of the legendary romance of Hero and her lover Leander, who supposedly swam across the Hellespont from Abydos each night to meet her.

SET OFF, in law, an actionable counterclaim or cross-demand which a defendant sets of against a plaintiff's demand. It may reduce the plaintiff's claim or extinguish it, according to the amount involved. It differs from a recoupment in that it does not necessarily arise out of the transaction which brings on the plaintiff's action. The right of set off exists only for liquidated claims or for claims which can be ascertained by calculation.

SETE, sĕt (formerly CETTE), seaport, France, located in Hérault Department, on the Mediterranean Sea, about 17 miles southwest of Montpellier. This fortified port is situated on a sandy strip of land between the Étang de Thau lagoon and the Gulf of Lions. It lies at the base of 591-foot Mont St. Clair and is intersected by a network of canals and slips. After Marseille it is France's second Mediterranean port. A wine-export center, Sète also manufactures chemicals, electrical equipment, and wine casks, and produces vermouth. Other industries include petroleum refining, sardine canning, and olive preserving. The port was built during the 17th century by Jean Baptiste Colbert, controller general of finance under Louis XIV, and was fortified in the 18th century. It suffered heavy damage during World War II. Pop. (1946) 29,914.

SETE LAGOAS, sâ'tĕ lȧ-gō'ȧs, city, Brazil, situated in Minas Gerais State, about 35 miles northwest of Belo Horizonte. It is served by a railroad, and is the state's leading center for marble quarrying and quartz crystal mining. It also has textile mills and ships sugar, cotton, and cereals. An experimental wheat station is located here, and caves in the vicinity have yielded rare fossils. Pop. (1940) 10,537.

SETH, sĕth, or **SHETH,** shĕth, in the Old Testament, the third son of Adam, born after Abel's death, according to Genesis 4:25. Another tradition, based on Genesis 5:3, makes Seth the first-born son of Adam and Eve. He was the father of Enos or Enosh, and the genealogical table in I Chronicles 1:1 mentions him as an ancestor of Noah. Luke traced him as an ancestor of Christ (Luke 3:38). He was made the object of special reverence by a heretical Jewish sect called the Sethites, whose doctrine was later adopted by a Christian Gnostic sect as well.

SETH, Andrew (later known as ANDREW SETH PRINGLE-PATTISON), Scottish philosopher: b. Edinburgh, Scotland, Dec. 20, 1856; d. near Selkirk, Sept. 1, 1931. He taught logic and philosophy at the University College, Cardiff (1883–1887), and at St. Andrews (1887–1891), and then was professor of logic and metaphysics at the University of Edinburgh for 28 years until 1919. In 1898 he added Pringle-Pattison to his name as a condition of accepting the bequest of The Haining, an estate near Selkirk. His philosophical position has been described as "liberal traditionalist." Among his works are *The Development from Kant to Hegel* (1882); *Scottish Philosophy* (1885); *Man's Place in the Cosmos* (1897); *The Philosophical Radicals* (1907); *The Idea of Immortality* (1922).

SETI I, sĕ'tē (Gr. SETHOS), Egyptian king of the 19th (Diospolite) dynasty. The son of Rameses I and father of Rameses II, he reigned from 1313 to 1292 B.C. He conquered Palestine, fought successfully against the Libyans to the west, and with less success against the Hittites in Syria. Seti is noted for the splendid temple of Osiris he built at Abydos and also for the hall of columns, started by his father, which he completed at Karnak.

SETIF, sā'tēf (ancient SITIFIS), city, Algeria, located in Constantine Department on the Algiers-Constantine railroad, about 70 miles southwest of Constantine. It is situated in the High Plateaus at an altitude of 3,600 feet in a cereal-growing region. A local trade and communications center, it has a grain and livestock market, manufactures carpets, and mills flour. Sétif dates back to the 1st century A.D. when the Romans founded it as a veterans' colony. The French established the modern city as a fortified post in 1838. Pop. (1948) 39,883.

SETON, sē't'n (also SEYTON or SEATOUN), name of a Scottish noble family, including:

GEORGE SETON, 5TH LORD SETON: b. ?1530; d. Jan. 8, 1585. When Mary, Queen of Scots, assumed the throne of Scotland in 1561, he became a member of her Privy Council and master of the household, remaining one of her most loyal supporters for the rest of his life. Mary spent her honeymoon with Lord Darnley at Seton's estate in East Lothian, took refuge there for a time after the assassination of David Rizzio (1566), and again after the death of Darnley (1567). Seton aided her escape from Lochleven in 1568 and fought under her standard at Langside, where he was taken prisoner. After Mary's internment in England, he became temporarily reconciled with the regent, James Douglas, 4th earl of Morton, but later turned against him and was one of the judges at Morton's trial in 1581.

SIR ALEXANDER SETON, 1ST EARL OF DUNFERMLINE: b. ?1555; d. near Musselburgh, Midlothian, Scotland, June 16, 1622. Fourth son of the preceding, he was originally intended for a career in the Catholic Church, and as a youth attended the College of Jesuits in Rome. Eventually he turned to the law and became a Protestant, but retained strong Catholic sympathies. He became a member of King James VI's Privy Council in 1585; lord president of the Court of Session in 1593; guardian of the infant Prince Charles, later King Charles I of England, in 1600; and vice chancellor of Scotland in 1604, when he also rendered valuable service as a member of the commission which negotiated the union with England under King James. In 1606, Seton was named chancellor of Scotland and earl of Dunfermline. He was a member of the English Privy Council from 1609 and one of King James' principal advisers.

CHARLES SETON, 2ND EARL OF DUNFERMLINE: d. January 1673. Son of the preceding, he was one of the leaders of the Scottish army which in

the First Bishops' War (1639) successfully resisted Charles I's attempt to impose episcopal church government in Scotland. He was also a member of the commission which negotiated the Treaty of Ripon (1640), ending the Second Bishops' War. In November of the latter year he was appointed to Charles' Privy Council, and after the king's execution, became an active supporter of Charles II. At the Restoration he was made a privy councilor and, in 1671, lord privy seal.

SETON, Elizabeth Ann (nee BAYLEY; usually called MOTHER SETON), American religious leader: b. New York, N. Y., Aug. 28, 1774; d. Emmitsburg, Md., Jan. 4, 1821. The daughter of a Columbia College anatomy professor, she married William Magee Seton, a merchant, in 1794, and in 1797 founded New York's first charitable organization, called the Society for the Relief of Poor Widows with Small Children. After her husband's death, she joined the Roman Catholic Church in 1805. Four years later, at Emmitsburg, Md., she organized a community of women called the Sisters of St. Joseph (later the Sisters of Charity of St. Joseph), which was modeled on the Daughters of Charity of St. Vincent de Paul in France. Mother Seton served as the first superior of the order, which grew to some 20 communities before her death in 1821. Its members were active in charitable and educational work, and were chiefly responsible for the establishment of the parochial school system in the United States. The organization became a section of the Daughters of Charity of St. Vincent de Paul in 1850.

Consult Seton, Robert, *Memoirs, Letters and Journal of Elizabeth Seton,* 2 vols. (New York 1869); and Burton, Katherine, *His Dear Persuasion* (New York 1940).

SETON, Ernest Thompson (originally ERNEST SETON THOMPSON), American author and illustrator: b. South Shields, Durham, England, Aug. 14, 1860; d. Santa Fe, N. Mex., Oct. 23, 1946. He was brought up and educated in Canada, living much of the time in the backwoods and later on the Western plains of the United States. He studied art at the Royal Academy in London and then in Paris from 1890 to 1896. Seton is noted for his many self-illustrated stories of animal life, his most popular book being *Wild Animals I Have Known* (1898; new ed. 1942). In 1902 he founded the Woodcraft Indians, an outdoor organization for children which later became the Woodcraft League of America. He was one of the founders of the Boy Scouts of America, and served as its chief scout from 1910 to 1915. Among his best-known stories are *The Trail of the Sandhill Stag* (1899); *Biography of a Grizzly* (1900); *Lives of the Hunted* (1901); *Two Little Savages* (1903); *Biography of an Arctic Fox* (1937); and his autobiography, *The Trail of an Artist-Naturalist* (1940).

Consult *Ernest Thompson Seton's America,* ed. by Farida A. Wiley (New York 1955).

SETON HALL UNIVERSITY, a Roman Catholic institution in New Jersey, founded in 1856 as Seton Hall College by James Roosevelt Bayley, than bishop of Newark, and Bernard John McQuaid, its first president. It was named in memory of Elizabeth Ann Seton (q.v.). Originally located in Madison, N. J., the campus was moved to South Orange in 1860, and branches have since been established in Newark, Paterson, and Jersey City, N. J. Seton Hall became a university in 1950. Besides the undergraduate colleges, there are schools of education, business, law, and nursing, and a graduate faculty which confers masters' degrees in a number of fields.

Seton Hall was at one time a men's college exclusively, but it now admits women to all its divisions except the undergraduate college at South Orange. The United States Army sponsors a Reserve Officers' Training Corps program at the institution, specializing in military police and military government training.

SETON-WATSON, -wŏt's'n, **Robert William,** British historian: b. Ayton, Perthshire, Scotland, Aug. 20, 1879; d. Skye, Scotland, July 25, 1951. He was educated at Winchester and at New College, Oxford (B.A., 1902; D.Litt., 1910), and from 1903 to 1906 he studied at the universities of Berlin, Paris, and Vienna. An expert on central Europe and the Balkans, he was professor of central European history at the University of London (1922–1945) and professor of Czechoslovak studies at Oxford (1945–1949). He founded the magazine *New Europe* (1916), and was joint editor, with Sir Bernard Pares, of the *Slavonic Review* (1922–1949). His works include *The Southern Slav Question* (1911), *The Rise of Nationality in the Balkans* (1917), *Europe in the Melting Pot* (1919), *Slovakia Then and Now* (1931), *Britain in Europe, 1789–1914* (1937), *Britain and the Dictators* (1938), *From Munich to Danzig* (1939), and *History of the Czechs and Slovaks* (1943).

SETTEMBRINI, sāt-tâm-brē'nē, **Luigi,** Italian writer and patriot: b. Naples, Italy, April 17, 1813; d. there, Nov. 3, 1876. He was educated at the College of Maddaloni and studied law at the University of Naples. In 1835 he became professor of rhetoric at the College of Catanzaro, where he was co-founder of a secret society called "The Sons of Young Italy." His propaganda for Italian unity led to his arrest in 1839, and he remained a political prisoner in Naples until 1841. In 1848 he was one of the founders of "The Grand Society of Italian Unity," and the following year was again arrested. This time he was imprisoned for about 10 years, most of the time in the Santo Stefano penitentiary. In 1859 he was deported to America, but with the help of his son Raffaele he managed to divert the ship to Ireland, where he escaped. He returned to Italy in 1860, and after the Kingdom of Italy was established he became professor of the history of Italian literature at the University of Naples. Later, in 1873, he became a member of the Italian Senate. His most notable publication is *Lezioni di letteratura italiana,* in three volumes (1866–1872).

SETTERS, a breed of dogs named from their former habit of crouching, or "setting," on observing the game which they are trained to hunt. In modern days, however, the setter remains erect on coming up with his quarry, and points his nose at it, as does the pointer. Setters require much exercising. They are marked for their handsomeness, intelligence, and pleasant dispositions, and they make good family dogs. The three different types vary in color. The English setter is among the foremost of hunting dogs; it is adapted to colder climates than is the pointer. The Gordon setter appears to be especially

adapted to woodcock shooting. The Irish setter, with its coloring of chestnut or mahogany, is a favorite at bench shows. See Dog.

SETTIGNANO, Desiderio da. See Desiderio da Settignano.

SETTLE, sĕt'l, **Elkanah,** English poet, playwright, and pamphleteer: b. Dunstable, England, Feb. 1, 1648; d. London, Feb. 12, 1724. He entered Trinity College, Oxford, in 1666, but left without taking a degree, and went to London. Beginning with *Cambyses, King of Persia* (1666), he wrote a series of heroic tragedies, the most successful of which was *The Empress of Morocco* (1671). For a time he was regarded as a rival of John Dryden, who satirized him as Doeg in *Absalom and Achitophel.* Settle was appointed city poet in 1691, but died penniless in the Charterhouse. Although his dramatic style is bombastic, he is credited with having understood theatrical production and the use of scenic effect.

SETTLEMENT, Act of. See Act of Settlement.

SETTLEMENTS, Social. See Social and University Settlements.

SETUBAL, sĕ-tōō'b-l (formerly called in English St. Ubes or St. Yves), seaport, Portugal, capital of Setúbal District, situated in Estremadura Province on the Bay of Setúbal, about 20 miles southeast of Lisbon. It is Portugal's second-best harbor, after Lisbon, and its third largest city. A leading sardine-canning center, its manufactures include fertilizer, cement, pottery, corks, biscuits, and soft drinks. Shipbuilding and distilling are other important industries. Setúbal also is a trade center for muscatel wine and oranges, and it has sizable saltworks. During the reign of John II (1481–1495) it was a royal residence, but most of its historic buildings were destroyed in a severe earthquake in 1755. Ruins of Cetobriga, an ancient Roman town, were excavated on the promontory opposite Setúbal in 1850. Pop. (1950) 44,030.

SEURAT, sû'rà, **Georges,** French painter: b. Paris, France, Dec. 2, 1859; d. there, March 29, 1891. He studied at the École des Beaux-Arts under Henri Lehmann, a former pupil of Jean Auguste Dominique Ingres, and in 1884, with Paul Signac, formed a new group called the neo-impressionists. Seurat's work was a refinement of the impressionists' broken-color technique. He built up his forms by juxtaposing small dots of primary colors in systematic patterns, producing an effect of diffused light and atmospheric vibration without sacrificing color. This method was called pointillism or, by the artists themselves, divisionism. Seurat's work also has been acclaimed for its well-developed, almost geometric design. His *Un dimanche à la Grande Jatte* (1886), a characteristically large canvas now at the Chicago Art Institute, is generally considered his masterpiece. *Baignade* (1884), his first neoimpressionist painting, is at the Tate Gallery in London. Before his death at the age of 31, Seurat painted four other large canvases; he has also left a number of fine drawings of dock scenes in Brittany. Examples of his work are found at the Barnes Foundation in Philadelphia and at the Louvre in Paris.

Consult Pach, Walter, *Georges Seurat* (New York 1923); and Laprade, J. de, *Georges Seurat* (Paris 1945).

SEVAN, sĕ-vän' (Turk. Gökcha; ancient Lychnitis), lake, east central Armenian SSR. It is at an altitude of 6,285 feet, and is 546 square miles in area. The Zanga River is its outlet. Evaporation of the lake's waters has been reduced and water outflow increased by the Sevan-Zanga hydroelectric project.

SEVASTOPOL, sĕ-văs'tô-pôl (formerly Sebastopol), city, USSR, located in RSFSR, in the southwest Crimea, on the Black Sea. Sevastopol Bay, the Black Sea's best natural harbor, is large and deep. Four miles long and one-half mile wide, it receives the Chernaya River at its eastern end. The city is an important naval base and shipbuilding center, and has light manufacturing. Its main section is located on a slope between the bay and its southern arm. Center of a Crimean health resort area, the city has an institute of physiotherapy; its museums have cultural importance. The Malakhov, or Malakoff, is a fortification in the southeastern part of the city which was captured after a long siege in 1855, during the Crimean War, and in 1942, during World War II. Between Sevastopol Bay and the Black Sea extends a promontory on which, three miles west of the city, was located a Greek colony known as Chersoneus Heracleotica. Founded in the 5th century, the colony later became a trade center under the Byzantine Empire. Ruins of the colony may be seen.

Sevastopol itself was originally the Tatar village of Akhtiar, founded in the 16th century, and was annexed under Catherine the Great of Russia in 1783. Thereafter, it was the principal Russian naval base on the Black Sea. It was besieged by Allied forces for 11 months during the Crimean War in 1854–1855, the Russians retiring after the town had been destroyed. The French and English engineers then blew up the docks and forts, which, by the Paris Treaty (1856) were not to be rebuilt. These restrictions were annulled by the London Conference of 1871, and the docks and forts were restored by the Russian government. Since 1890, the port has been exclusively a military base, guarding the Black Sea entrance to the Ukraine and to Caucasia, and foreign trade at the port is held down to the minimum in goods required for use by the Soviet government. The city was shelled during World War I. During World War II it underwent a siege comparable to that which it experienced in the Crimean War. It fell in July 1942, after being besieged for eight months by the Germans. Soviet forces stormed it in 1944, and regained it. After the war considerable rebuilding was undertaken. Sevastopol was given independent administrative-economic status within the RSFSR in 1948. Pop. (1939) 111,946. See Crimea—*The Crimean War*; World War II—*Crimean Campaign and Battle for Kharkum* and *The Russian Offensive.*

SEVEN, a number regarded in many religions as especially sacred, mystical, and symbolical. In the Bible, the work of creation having been completed in six days, the Creator rested on the seventh. Egypt's seven years of plenty were succeeded by seven years of famine (Genesis 41:46-56); for seven days the waters of Egypt were turned into blood (Exodus 7:20-25). Two of the three pilgrim festivals of the Hebrews, the Passover and the Feast of Tabernacles, lasted each seven days, and between

Passover and the Festival of Weeks (Pentecost) was an interval of seven weeks. The seventh year was a sabbatical year; the year following seven weeks of years was the year of jubilee. In the New Testament occur many groups of seven. In the Revelation (Apocalypse) alone, there are seven churches of Asia, seven stars, seven trumpets, seven spirits, seven horns, and seven eyes of the lamb. Among the Greeks the number seven was sacred to Apollo, and the Pythagoreans gave it a conspicuous place in their theories. The sacraments of the Roman Catholic Church are seven in number, and so are the orders of the ministry in the same church, there being four minor and three major or sacred orders. The number seven also has special significance in the religions of India, Hinduism and Buddhism. Various reasons have been given for the peculiar regard had for this number, such as that seven is a symbol of completeness, compounded as it is of three and four, perfect numbers, representable in space by the triangle and the square.

SEVEN AGAINST THEBES. See ETEOCLES AND POLYNICES.

SEVEN CHAMPIONS OF CHRISTENDOM, The, a romance of chivalry, by Richard Johnson, entered on the *Stationers' Register* in 1596. A second part appeared in 1608 and a third in 1616. In it are recounted the exploits of St. George of England, St. Denis of France, St. James of Spain, St. Anthony of Italy, St. Andrew of Scotland, St. Patrick of Ireland, and St. David of Wales.

SEVEN CHURCHES OF ASIA, a collective name applied in the Bible, in Revelation 1-2 (Apocalypse 1-2), to the churches of Ephesus, Smyrna, Pergamum, Thyatira, Sardis, Philadelphia, and Laodicea. There appear before St. John seven candlesticks, in the midst of which stands Christ, holding seven stars. Christ tells St. John that the seven stars are the angels of the seven churches, and that the seven candlesticks are the seven churches. He instructs the saint to write to the angels, and tells him what to write to each. The messages are brief exhortations to the followers of Christ which praise steadfastness and admonish against inconstancy.

SEVEN CITIES, Island of the, a fabulous Atlantic isle believed in the 14th and 15th centuries to have been settled by seven bishops and their followers expelled from Spain by the Moors in the 8th century. It may have been a late medieval revival of the classic Atlantis and Fortunate Isles myths.

SEVEN DAYS' BATTLES, a series of engagements fought near Richmond, Va., during the week of June 26–July 2, 1862, concluding the Peninsula Campaign of the American Civil War. Gen. George B. McClellan of the Union Army was on the Chickahominy River, only a few miles from Richmond, with 92,500 men. Gen. Robert E. Lee, the Confederate commander, was defending the city with 80,762 troops, including Stonewall Jackson's command, which had been brought up from the Shenandoah Valley. McClellan attempted to resume his advance on June 25, and an indecisive battle at Oak Grove resulted. Then Lee determined to seize the initiative. His plan was to turn McClellan's right flank and thus end the threat to the Confederate capital. To this end he sent Stonewall Jackson against McClellan's right from one direction, while he himself attacked from another. He threw three strong divisions led by Ambrose Powell Hill, James Longstreet, and Daniel Harvey Hill across the Chickahominy to cooperate with Jackson, and without waiting for him to arrive, attacked Gen. George Archibald McCall's division of Pennsylvania Reserves at Mechanicsville and Beaver Dam Creek, and was finally repulsed with great loss. On the 27th, McCall was withdrawn, Jackson made connection with Lee, and the combined Confederate forces attacked Fitz-John Porter's corps and McCall's division, later reinforced by Henry Warner Slocum's division, at Gaines' Mill (q.v.), the result being a bad defeat for the Union forces; Lee's losses, however, in killed and wounded, were about double those of Porter.

Porter retreated across the Chickahominy, and McClellan started on his retreat, or change of base, to James River. Lee pursued and on the 29th fought the two battles of Peach Orchard and Savage Station, both of which were drawn battles, although in both cases the Union troops withdrew from the field to continue the retreat which they had successfully covered. On the 30th, part of the Union Army and nearly all of Lee's army fought the bloody Battle of Frayser's Farm (q.v.), the Union forces holding the ground until after dark covering the passage of the trains, and defeating all of Lee's persistent efforts to break and destroy it. The last of the Seven Days' Battles was fought at Malvern Hill (q.v.), July 1, resulting in a bloody repulse for Lee. That night the Army of the Potomac withdrew to Harrison's Landing on the James River.

According to General Longstreet, General Lee's plans in the Seven Days' Battle were excellent, but were poorly executed, and in an official report, General Lee remarked that "under ordinary circumstances the Federal Army should have been destroyed." That it was not destroyed is due to the skill of McClellan in conducting the retreat and even more to the fighting quality of his subordinate officers and their men. See also PENINSULA CAMPAIGN OF 1862, THE.

SEVEN HUNTERS, The. See FLANNAN ISLANDS.

SEVEN LAMPS OF ARCHITECTURE, The, a treatise on architecture by John Ruskin, published in 1849. In this book architecture is regarded as the revealing medium or lamp, through which flame a people's passions and which embodies their life, history, and religious faith, in temple, palace, and home. The first lamp is Sacrifice, next comes the Lamp of Truth, the third and fourth lamps are those of Power and Beauty. The fifth is the Lamp of Life, and the last two lamps are those of Memory and Obedience. Ruskin affirms that "the architecture of a nation is great only when it is universal and established in its language, and when provincial differences in style are nothing more than so many dialects." His championship of the Gothic style as the greatest of all architectural creations contributed to the Gothic revival of his day.

SEVEN PILLARS OF WISDOM, Thomas Edward Lawrence's narrative of the Arab revolt against the Turks in World War I, which revolt led to the establishment of the present Arab nations. The book was rewritten three times in the years following the war. A few trial copies were

privately printed in 1922, and a larger subscription edition, in 1926. In 1927, somewhat less than half the text was commercially published in Britain and the United States as *Revolt in the Desert*. The whole work was not issued for general circulation until 1935.

Early in the war, Lawrence was serving with the British army in Egypt. When the Arab revolt broke out, his knowledge of the people and their language, acquired during prewar years as an archaeologist, made him a logical choice as liaison officer between the rebels and the British. After meeting the leaders, Lawrence decided that Prince Feisal, son of the Sherif of Mecca, was the most competent of the chieftains. From then onward, Lawrence worked with Feisal, furnishing most of the long-range planning of the campaigns. His most brilliant contribution to strategy came with the realization that Arab weakness in matériel and formal military discipline could be exploited as an asset, by avoiding pitched battles and harassing the Turks by constant swift guerrilla raids against their communications. The Turks were allowed to hold, at great cost, their fortified posts; the rest of the country belonged to the Arabs. The capture of Akaba, July 6, 1917, freed the entire Hejaz except for the beleaguered Turkish garrison in Medina. Thereafter, the war shifted steadily northward, till the Arabs formed the right wing of Field Marshal Edmund Allenby's victorious advance in September 1918. With the capture of Damascus, Oct. 1, 1918, Lawrence's part in the war ended.

The Seven Pillars of Wisdom is a great narrative of warfare and adventure pursued to the utmost of human endurance; it is also a revelation of one of the most remarkable characters of modern times. Lawrence took pride in making himself as hardy as the Arabs whom he led, and acquired their fatalistic contempt for pain and death. He emerges from these pages as a man of cold, penetrating intellect: a crusader, fired by loyalty to the cause and the men to whom he had pledged his word, and a child of the 20th century in his tortured doubts of himself and his cause.

DeLancey Ferguson.

SEVEN PINES, Battle of. See Fair Oaks (Seven Pines), Battle of.

SEVEN SAGES, in ancient Greece, the collective designation of seven ancient philosophers and sages. According to a commonly accepted listing, they were Solon of Athens, Thales of Miletus, Pittacus of Mitylene, Bias of Priene, Chilon of Sparta, Cleobulus of Lindus, and Periander of Corinth. They all lived between 620 and 548 B.C.

SEVEN SEAS, The, a collection of verse by Rudyard Kipling, containing several of the author's most vigorous and characteristic poems, originally published as a separate volume in November 1896. It has also been included, under the same name as a subtitle, in a larger and more comprehensive collection, entitled *Verses*.

While *The Seven Seas* is not limited in range, containing, as it does, poems on many themes—virile songs in stirring rhythms, such as *The Last Chantey*, striking character portraits like that of the grim old shipowner of *The Mary Gloster* and of "the dour Scots engineer" of *McAndrew's Hymn* and *The Last Rhyme of True Thomas* and other lyrics and ballads of a high order—still, the dominant note, sounded especially in *A Song of the English*, is a fervent, almost religious belief in Britain's world supremacy—what Paul Elmer More calls the poet's "earnest conviction that the English race, 'the Sons of the Blood,' are destined to sweep over the earth and fulfill the law of order and civilization." It was this note that caused the poet to be hailed the unofficial laureate of the British Empire. Kipling's frequent use of colloquialisms and slang, however appropriate when his speakers are such careless folk as soldiers and sailors, have led some critics to disparage his claims to the laurel. Yet his eager revelation of the charm and beauty inherent in "things as they are," is precisely what endears him the most. As Charles Eliot Norton says: "The poet finds today as entertaining as any day that ever dawned, and man's life as interesting and as romantic as it ever was in old times. . . . It is enough now gratefully to recognize that he continues the succession of royal English poets, and to pay him the homage which is his due."

SEVEN SLEEPERS, a Christian legend widely disseminated in manuscripts throughout the Western and Oriental world, and even found in Mohammedan sources. The earliest preserved record of it is a Syriac text from the beginning of the 6th century. The story relates that during the persecution of the Christians under the emperor Decius (201–251), seven noble youths of Ephesus, having refused to worship pagan idols, concealed themselves in a nearby cavern, the entrance of which was closed by order of the emperor. The persecuted youths immediately fell into a deep slumber, from which they were accidentally awakened in the reign of Theodosius II (401–450), after the lapse of two centuries. The stone blocking the entrance to their retreat having been removed by a shepherd, one of their number went to the city to purchase bread. He was astonished to see the Christian cross erected in the city, and the citizens were confounded by his antiquated dress, obsolete dress, and old money which he offered in payment for bread. Suspected of having found a secret treasure, he was carried before a judge, to whom he related his miraculous story. The bishop of Ephesus, the magistrates, and even the emperor himself hastened to the cave and found the sleepers still bearing the bloom of youth. Before they expired, one of them explained to the emperor that God had caused them to fall asleep in order to demonstrate the proof of the resurrection.

SEVEN WEEKS' WAR, the Austro-Prussian War of 1866, provoked by the German foreign minister, Otto von Bismarck, in order to establish Prussian political supremacy over the German people, and precipitated by the Schleswig-Holstein controversy (see Bismarck, Prince Otto von). Prussia was supported by Italy, while Austria's allies included Bavaria, Württemberg, Saxony, Hanover, Baden, and other smaller German states. Under Count Helmuth von Moltke, the Prussians won victories in rapid succession, outfighting the Austrians in every skirmish, and defeated them decisively at the Battle of Königgrätz, or Sadowa, on July 3, after about seven weeks of actual fighting. The negotiations at Nikolsburg (July 26) were confirmed by the Peace of Prague (Aug. 23) and subsequent acts of formal settlement. Prussia then established and dominated the North German Confederation, which, after the Franco-Prussian War, paved the way for empire (1871).

SEVEN WONDERS OF THE WORLD, a selection of seven ancient works of art and archi-

tecture regarded by the Greek and Roman world of the Alexandrian epoch and later as awe-inspiring, and pre-eminent in size or splendor. An opuscule entitled *De septem orbis miraculis*, attributed to Philo of Byzantium, gives one listing of the seven; a variant is offered by Antipater of Sidon. According to the most popular tradition they were: (1) the pyramids of Egypt; (2) the hanging gardens of Semiramis and the walls of Babylon; (3) the statue of the Olympian Zeus by Phidias, at Olympia; (4) the Colossus of Rhodes; (5) the temple of Artemis at Ephesus; (6) the Mausoleum erected by Queen Artemesia at Halicarnassus; and (7) the Pharos (lighthouse) of Alexandria. Of these only the Pyramids have survived.

Pyramids.—Situated on the Nile's west bank above Cairo, the pyramids were erected in the period 3000–1800 B.C. by Egyptian monarchs to serve as their tombs. Of some 70 known pyramids the earliest example is that of King Zoser at Saqqara; reputedly designed by the royal physician Imhotep (q.v.), it is a step pyramid with five terraces. The largest are those at Giza, built for pharaohs of the Old Kingdom: Khufu (Cheops), Khafre (Chephren), and Menkure (Menkaure; Mycerinus). The first of these, called the Great Pyramid because the largest, measured originally 755 feet square at the base, towered 481 feet high, and covered an area of nearly 13 acres. It has been estimated that a labor force of about 100,000 men required 20 years to complete it.

Pyramids of Egypt.

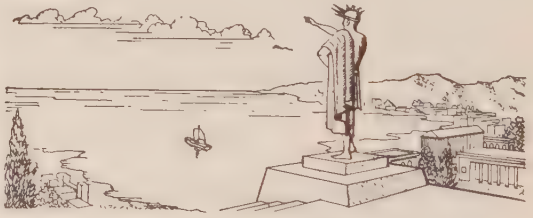
Hanging Gardens and Walls of Babylon.—Both the city walls and the hanging gardens which Greek travelers found so impressive were of the "new" city erected subsequent to Sennacherib's destruction of Babylon in 689 B.C. The Chaldean kings, Nabopolassar (r. 626–605) and his son Nebuchadnezzar II (r. 605–562) were builders of the mighty walls described by Herodotus and Ctesias in the 5th century B.C. Herodotus ignores the hanging gardens; other writers describe them as a series of terraces rising along the Euphrates bank and connected by marble stairways. Planted with a profusion of trees, shrubs, and flowers, the gardens were watered by fountains fed through pipes from cisterns in the topmost terrace. Nebuchadnezzar had the world's most celebrated gardens developed as an adjunct of his palace; but the Greeks ascribed them to Semiramis, a legendary queen of Babylon, daughter of the goddess Derceto.

Hanging gardens of Babylon.

Statue of Zeus by Phidias.—Like the Athena statue for the Parthenon, Phidias' colossal statue of Zeus was a chryselephantine work, the flesh parts of ivory on a wood or stone core, the drapery and other ornaments of gold. The sculptor represented the god crowned with an olive wreath and seated on a cedarwood throne which was adorned with gold, ivory, ebony, and precious stones. In his right hand Zeus held an ivory and gold statue of Victory, in his left a scepter surmounted by an eagle. The statue was placed in the great temple of Zeus in the sacred grove at Olympia (completed in 457 B.C.) and nearly attained the room's 60-foot roof. The Emperor Theodorus I removed it to Constantinople where it was destroyed in a fire in 475 A.D.

Statue of the Olympian Zeus by Phidias.

Colossus of Rhodes.—A popular name for the statue of the Sun designed by Chares of Lindus and erected overlooking the harbor of Rhodes. It required 12 years to build (292–280 B.C.), but survived only 56 years, being overthrown and broken to pieces by an earthquake in 224 B.C. The statue was upward of 105 feet tall. It is said that the fragments remained *in situ* for 896 years until a Moslem general, in 672 A.D., sold them to a Jew of Emesa.



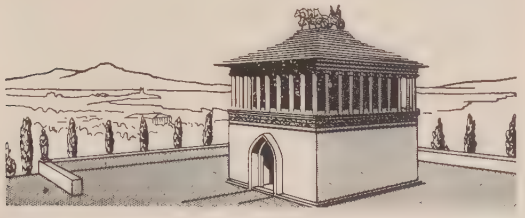
Colossus of Rhodes.

Temple of Artemis.—The famous temple dedicated to Artemis at Ephesus, chief of the 12 Ionian cities in Asia Minor, was designed and built by the architect Chersiphron in the 6th century B.C., Croesus contributing to the building fund. Burned down by Herostratus in 356 B.C., it was rebuilt by the joint efforts of all the Ionian states. It was again destroyed when the Goths sacked the city in 262 A.D. Fragments of the columns of the original temple are in the British Museum.

Temple of Artemis at Ephesus.

Mausoleum at Halicarnassus.—After the death in 353 B.C. of Mausolus, king of Caria in Asia Minor, his widow, Queen Artemisia, determined to commemorate him with the most costly

memorial. The structure, designed by Pythius and adorned by sculptures of Scopas and Praxiteles, was destroyed by an earthquake before the 15th century.



Mausoleum erected by Queen Artemisia at Halicarnassus.

Pharos of Alexandria.—Erected about 270 B.C. in the reign of Ptolemy II Philadelphus on an islet off the harbor of Alexandria, this lighthouse was the prototype of all the similar structures built on the coasts of the Roman Empire.

Pharos of Alexandria.

SEVEN YEARS' WAR, a war between Prussia and other European powers (1756–63). By the treaties of peace concluded at Breslau 28 July 1742, and at Dresden 25 Dec. 1745, Maria Theresa of Austria ceded to King Frederick II six principalities of Silesia and the county of Glatz. In the hope of recovering them she concluded an alliance with Elizabeth, empress of Russia, brought over to her cause the king of Poland and elector of Saxony, Augustus III, and attempted to form a closer union with France. Meanwhile a dispute had arisen between Great Britain and France relating to their American boundary, and it broke out in 1755 into open hostilities. The king of England concluded an alliance with Prussia; and some months after France made a league with the court of Vienna. All the proceedings of the Russian, Austrian and Saxon courts were discovered to Frederick, who resolved to anticipate his enemies. In August 1756, he invaded Saxony, occupied the capital, which had been deserted by the court, Leipzig, Wittenberg and Dresden; took possession of the documents necessary to justify his conduct which he found in the archives of the cabinet in the last city, and invested the Saxon army in their fortified camp at Pirna. Meanwhile Field-Marshal Browne advanced from Bohemia with an army to liberate Saxony; but Frederick was able to check his advance, and the Saxons, 14,000 strong, were forced to surrender 15 October. The inferior officers and common soldiers were compelled to enter the Prussian service; but they soon deserted, making their escape to Poland, where the Saxon court resided during the whole war. Such was the end of the first campaign, and the Prussians remained through the winter in Saxony and Silesia. Frederick's invasion of Saxony was pronounced to be a violation of the Treaty of Westphalia, and France, as one of the guarantors of that treaty, now took part in the struggle. Sweden and Russia adopted a similar course. In the diet at Ratisbon, held in January 1757, war was also declared on the part of the empire against Prussia.

Thus in 1757 Austria, Russia, France, Sweden and the German empire were in arms against Frederick, while he had no ally but England and a few German states (Brunswick, Hesse-Cassel and Gotha, besides, of course, Hanover). In order to be again beforehand with his enemies, Frederick (April 1757) marched into Bohemia, and on the 6th of May a bloody battle was fought at Prague, in which the Prussians conquered, but lost their distinguished general, Schwerin. The greatest part of the vanquished Austrian army threw itself into the city of Prague, to which the king immediately laid siege. But the defeat of Frederick by the Austrians under Daun, at Kollin, in the following month, 18 June, deprived the former of all his advantages. He was forced to raise the siege of Prague, and to retreat to Saxony and Lusatia. Little more than a month later, 26 July, the Duke of Cumberland, commanding the German allies of Frederick, was defeated at Hastenbeck on the Weser, in the south of Hanover, by the more numerous army of the French; whereupon the victors made preparations for taking up winter quarters with the imperial army in Saxony. The two armies had already united and advanced as far as the Saale, the French under the command of the incapable Prince Soubise, a favorite of the Marquise de Pompadour, when Frederick marched against them, and fought at Rossbach, a village between Merseburg and Weissenfels, that memorable battle, in which both the French and the imperial armies were defeated, and found safety only in a hasty flight 5 November. The defeated armies retired into winter quarters at a distance, and the possession of Saxony was secured to the king. Upon this Frederick hurried back to Silesia, which was now occupied by the Austrians. With a small army, fatigued with a long march, he defeated at Leuthen a force twice as great, under Daun, 5 December. By this victory Frederick recovered Silesia, and he was now more formidable to his foes than ever; for not only had he been victorious himself, but while he had been thus occupied in the south and west his general Lehwald had successfully repelled the Swedes and Russians on the north and east.

The third campaign was opened in February 1758, by Ferdinand, Duke of Brunswick, who was now at the head of the allied armies, in the place of the Duke of Cumberland, and opposed the French in Lower Saxony and Westphalia. His nephew, the hereditary prince, afterward Duke of Brunswick, Charles William Ferdinand, commanded under him. Duke Ferdinand made himself master of the Weser, expelled the French, under Clermont, from Lower Saxony and Westphalia, and defeated them 23 June at Krefeld. He then returned over the Rhine to Hesse, where Soubise was stationed with a French army, and whither Clermont followed him. Ferdinand, in the meanwhile strengthened by 12,000 British troops, forced the two hostile bodies to retire over the Main and the Rhine, where they went into winter quarters. Mean-

while the Russians, under Bestucheff, had advanced as far as the Oder; and subsequently Fermor, who superseded Bestucheff, occupied east Prussia, and then moved into Brandenburg, spreading devastation on his way. At this juncture Frederick made a masterly march to the Oder, and toward the end of August engaged the Russians at Zorndorf, in the north of Brandenburg, where he gained a sanguinary victory, which forced the Russians to retreat to Poland. After this he again turned his attention to Saxony, where his brother Prince Henry was no longer able to resist the Austrians. He encamped at Hochkirch, but here he was surprised by Daun in the night of 14 October and suffered a total defeat. He nevertheless succeeded with the remains of his army in effecting a junction with his brother, after which he again drove the enemy out of Silesia and Saxony. At the close of the campaign the king saw all his dominions except Prussia proper free from the enemy. In France there was a general wish for peace; but Louis XV and his mistress, the Marchioness de Pompadour, were bent on continuing the war. A new alliance was therefore concluded with Austria 30 Dec. 1758. Frederick, however, had also obtained a new treaty with Great Britain, which promised him a large yearly subsidy. Yet he determined in the coming campaign to act with his main army as much as possible on the defensive and to commit aggressive movements to detached corps.

The campaign was opened in March 1759, Prince Henry marching into Bohemia, where he dispersed the hostile forces, and captured immense quantities of military stores. He then entered Franconia, and put the inactive imperial forces to flight. At the same time the Prussian general Dohna drove back the Swedes once more to Stralsund, and managed to keep the Russians for a time in check. But when the Russians pressed forward in ever-increasing numbers under Soltikoff, Dohna found himself obliged to give way. Frederick then gave his command to General Wedel, who received orders to prevent the junction between the Russians and Austrians at all costs, and accordingly on 23 July attacked the Russians at Kay, near Züllichau, in the east of Brandenburg. His attack was unsuccessful, and the Russians after their victory advanced to Frankfort-on-the-Oder. Frederick now hastened in person to his electoral dominions, and on 12 August attacked the Russians at Kunersdorf, near Frankfort, and had already defeated them when the victory was snatched from him by the Austrians, under Laudon, who inflicted on him a defeat such as he had never before sustained. The Russians purchased their victory dearly, and they made no use of it. Yet Frederick's position was extremely dangerous; indeed, he began to apprehend an unfortunate issue of the war. The Russians were victorious in his hereditary states; Daun was in Lusatia with a large army, and Saxony was overrun by the imperial troops. The Austrians and Russians wished to unite, but Prince Henry deprived the former of their magazines, and thus obliged them to retreat; and Frederick anticipated the Russians in their march to Silesia, and compelled them to retire to Poland. In the west Frederick's allies had been more successful. They had, indeed, been able to do but little at the beginning of the campaign. The French had taken Frankfort-on-the-Main by surprise during the winter, and the plan for recovering the city was frustrated by the failure of the attack on Bergen 13 April. But 1 August, Ferdinand gained a decisive victory at Minden over the French troops under Contades and Broglio. On the same day the hereditary Prince of Brunswick likewise defeated the French at Gohfeld, and they were driven over the Lahn on one side and over the Rhine on the other. The Swedes also, who, after the battle of Kunersdorf, when Prussian Pomerania was destitute of troops, invaded that country, were driven by Manteuffel and Platen under the cannon of Stralsund. Thus, in spite of all his mishaps, Frederick's fortunes were still in the ascendant at the end of the campaign.

The campaign of 1760 seemed at first to forbode ill success to Frederick. While he himself was engaged in Saxony, the brave General Fouqué suffered a defeat in Silesia, in consequence of which the Austrians occupied the whole land. Frederick thereupon gave up Saxony in order to recover Silesia. With 30,000 Prussians he marched into that province, and intrenched himself at Liegnitz. Here on 15 August he defeated Laudon, and thereby effected his purpose of recovering Silesia, but he was unable to prevent Austrian and Russian troops from breaking into Brandenburg and laying waste his hereditary dominions. Frederick hastened thither to cut off the enemy, but not finding them there he returned to Saxony, where the imperial forces were stationed, and Daun and Lascy had united. At Torgau, on the Elbe, he attacked the enemy 3 November, defeated them in a bloody engagement, and then went into winter quarters in Saxony. The Russians were also forced to raise the siege of Colberg and to retire to Poland. The allied forces, under Ferdinand of Brunswick, defeated the French 31 July at Marburg; but the latter remained in Hesse.

In the opening of the next campaign 11 Feb. 1761 Ferdinand attacked the French in their quarters; they fled, losing many of their fortifications and magazines. A corps of French and Saxon troops was defeated 14 February at Langensalza: but the allies were obliged to raise the siege of Ziegenhain, Marburg and Cassel with loss, and the French once more became masters of all Hesse, and had an unobstructed passage to Hanover. The proposals of peace now made by Britain and Prussia were not accepted, and Frederick endeavored to protect Silesia against the Austrians and Russians, who had united in August at Striegau. He and his allies, however, met with reverses at Schweidnitz, Colberg and elsewhere, and despite some successes (as at Villingshausen) Frederick felt himself in a desperate condition. But at the very time when Frederick's distress was greatest, Elizabeth, the empress of Russia, died 5 Jan. 1762, and her successor, Peter III, concluded with him 5 May the Peace of Saint Petersburg. Sweden likewise made peace with Prussia, and the Russian emperor sent a body of troops to aid the Prussians. But the emperor's early death broke the alliance with Frederick, and his successor, Catharine II, recalled the Russian troops from the Prussian service. Frederick, however, was delivered from one dangerous enemy, and had gained an important preponderance of strength over the rest. After recovering Schweidnitz and providing for the defense

of Silesia, he marched to Saxony. On October 29, an important victory was won over the Austrian and imperial forces at Freiberg, and the king now concluded an armistice with the Austrians, although it related only to Saxony and Silesia. Under Duke Ferdinand of Brunswick, the allies then began the campaign of 1762 against the French; the latter were defeated on June 24 at Wilhelmsthal and driven from their fortified camp at Kassel. Two days later at Fontainebleau the preliminaries of peace between Britain and France were signed, and the peace itself was confirmed at Paris on Feb. 10, 1763. After a short negotiation Frederick concluded a peace with Austria and Saxony at Hubertusburg, Feb. 15, 1863, by which each power received again all the territories that it had possessed before the war. The simultaneous struggle between Great Britain and France in North America—the French and Indian War—and in India ended with the decisive victory of the former, and with France losing almost all her North American and Indian territory.

See also CANADA—*Great Britain's Fight with France for North America: 1756–1763;* COLONIAL WARS IN AMERICA; also the relevant biographies, and the *History* sections of the articles on AUSTRIA, FRANCE, GREAT BRITAIN, and PRUSSIA.

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SEVENTEEN-YEAR LOCUST. See CICADA.

SEVENTEENTH CENTURY. In the first half of the 16th century, Lutheranism had firmly entrenched itself in northern Germany and had spread to the Scandinavian countries so that the Baltic had become almost a Lutheran lake. In the second half of the same century, a group of interconnected conflicts in the neighborhood of the English Channel had failed to bring about the suppression of Calvinism in Great Britain, Holland, and France. From 1576, and more particularly from 1594, Catholicism in Germany had passed to the counteroffensive, and here its conflict was against aggressive Calvinism, while the Lutherans were becoming a conservative interest, anxious for peace.

When the 17th century opened, the forces of the Reformation and the Counter Reformation (qq.v.) seemed to be gathering themselves for a final struggle in Germany, where imperial authority was in eclipse and imperial institutions were now failing to function. The whole balance of the Continent was in question, for a small margin seemed likely to decide whether the Austrian Habsburgs should lose their imperial position or should reassert their authority and combine with the Spanish Habsburgs to dominate Christendom. From the beginning of the 17th century, therefore, western Europe lay under the shadow of a great war. Plans for the establishment of perpetual peace symptomized the growing nervousness and combined with the "appeasement" policy of the Lutherans and of James I of England to give evidence of the horror which war inspired. Proposals for the reunion of Protestants and Catholics were brought out under the shadow of war by Hugo Grotius in Holland, for example, and later by John Dury in England.

Thirty Years' War.—The Austrian Habsburgs were in decline at the opening of the century, but during the first decade they were planning to rescue their dynasty, and during the second decade the plans were being put into effect. In 1597 the Counter Reformation had opened a remarkable new attack in Styria, and the Protestants, who had seemed to be consolidating their victories in the neighboring Habsburg territories, soon saw that they must be prepared to face actual warfare unless they were content to be put into definite retreat.

Beginning in Bohemia, extending to Germany, and moving thence into the region of the Baltic from 1624, the Thirty Years' War (1618–1648) brought the religious conflict in Europe to a climax and raised issues which were bound to affect the fate of the entire West. It gathered into itself all the regional controversies, local disputes, and international rivalries of Christendom, and became a more general war than any which had preceded it. As long as the Habsburgs went on winning successes in the course of the struggle, their victory at each successive stage only had the effect of bringing into the conflict a new enemy, whose security seemed threatened by their latest advance. Fortunately the Ottoman Porte was unable to take advantage of the distracted condition of the Christian countries in this period. The West made such marked improvements in military science during the course of the war that it proved decidedly superior to the East when the Turkish attacks were renewed in the latter half of the century.

The results of the war were: firstly, the rise of a vast Swedish Empire, which went on expanding during most of the century until it comprised almost all the coast of the Baltic; secondly, the effective origin of the modern problem of Alsace-Lorraine and the passage of France from a defensive policy to that career of aggression which is associated with the reign of Louis XIV; and, thirdly, the eclipse of the Spanish Habsburgs (who had come near to the domination of Europe in the 1580's) and the further reduction of Habsburg imperial power in Germany, with the result that the Austrian branch of the dynasty concentrated its attention in the future on the consolidation of its group of Danubian territories. The Peace of Westphalia (q.v.), which concluded the war in 1648, was the first of the series of great international treaties which from that time have periodically established an order and a territorial arrangement in Europe after a war involving the entire Continent.

Role of Louis XIV.—Partly because the Spanish Habsburgs were in decline and Spain herself was economically undermined, partly also because the Austrian Habsburgs were distracted by the renewed attacks of the Ottoman Turks, the French monarchy under Louis XIV (r. 1643–1715) embarked on an aggressive course after 1661, until fear of its Continental ascendancy united many nations against it in 1688. As he developed his career of conquest, Louis would cleverly isolate his enemy, reducing to a minimum the need for direct military action; and the great development which he gave to the French

diplomatic system and the practice of diplomacy had a marked effect on other countries, so that this branch of governmental activity advanced to a new stage. Furthermore, in the conflict against the France of Louis XIV, European statesmen became more conscious than ever before of the principle of the balance of power, and more scientific in their application of it.

MONARCHY

The 17th century marks a critical period in the history of European monarchy, for that institution had to meet a serious challenge in most of the countries of the Continent, as well as in England. This is the period when, in many monarchies and principalities, the conflict between the ruler and the parliamentary systems—the diets or estates—came to a point of critical decision. As in England, the conflict often involved the question of the king's right to keep a standing army, and the right of the parliamentary estates to give or withhold their assent to taxation. Now, as at other periods, the needs of the government in time of war, and the growing burden of expense as the methods of warfare developed, had much to do with the development which was given to the structure of the modern state.

Position of the Assemblies.—In the various countries of Europe and in many of the principalities of Germany the diets or estates had long held the princely ruler more tightly imprisoned than the English Parliament had done; and the extremes to which this had been taken in Bohemia, Hungary, and other Habsburg territories had been from the start one of the main issues involved in the Thirty Years' War. On the Continent, however, the assertion of "historic rights" against the ruler represented the obstructiveness of a selfish and reactionary nobility which controlled the proceedings in the "parliamentary" assemblies. It was the prince who sought to save the peasantry from the tyranny of their local lords, and who represented the general welfare of society against the selfish private privileges of the nobility. It was the prince who more truly represented the community at large and tended to gain the support of the nonnoble classes. The whole general conflict has sometimes been described, therefore, as the struggle of "The State *versus* the Estates."

Even in the United Provinces the provincial estates, as they opposed the monarchical and centralizing tendencies of the House of Orange, were reactionary, defending a system of local autonomy and resisting the attempt to weld them into a state. Even in France, where the States General (q.v.) ceased to function after 1614, the Parlement of Paris, consciously attempting to imitate the procedures of the contemporary English Parliament, was in reality supporting ancient privilege and private rights which obstructed the work of government. The conflict of the Habsburgs with the Bohemian nobility until 1620, and with the Hungarian nobility throughout the century; the bitter struggle of many German princes (including the Hohenzollern ruler of Brandenburg-Prussia) against their respective systems of estates; the English Civil War and Commonwealth (1642–1660); the French *Fronde* (q.v.) in the period 1648–1654; the "republican" regime of Jan De Witt in Holland, 1653–1672; and the ascendancy of the nobles in Denmark and Sweden —all these illustrate the vicissitudes of the institution of monarchy, particularly towards the middle of the 17th century. The rebellion of Portugal against Spain in 1640 and the great rising of Catalonia in the same year raised similar questions of principle; and the sufferings caused by the Thirty Years' War produced repeated further insurrections on the part of a hungry peasantry, as, for example, the rebellions in Sicily and Naples in 1647–1648.

The Forms of Monarchy.—The necessities of war and the requirements of internal order, however, showed that monarchical authority was still indispensable. Most of all there was need for an authority which should support the general welfare of society against nobles who refused to regard themselves as subjects, and against sectional groups which refused to bow to the authority of government. In France, where the king had sometimes acted as though he were merely the most privileged of the vested interests of the country, using his power to support one faction against another and sharing out the spoils amongst his favorites, Cardinal Richelieu (1585–1642) taught the monarch a higher, superintending role, separating his conduct in his private life from his function as the personification of the idea of the state. From 1661, Louis XIV brought this conception of monarchy to its climax and turned it into a work of art, making himself at any rate the greatest "actor of majesty" that Europe had ever seen. Neither Louis nor the monarchs of the next generation succeeded, however, in making the further distinction between the dynastic interests of the royal family and the interests of the body politic as such. The Restoration of 1660 in England; the establishment of the most extreme royal absolutism in Denmark in 1660–1665; the revival of the authority of the House of Orange in Holland, especially from 1672; the victory of the Hohenzollern dynasty over the estates in Brandenburg-Prussia (as in 1663 and 1667); and the triumph of the royal power in Sweden in 1680–1682, signalize the recovery of the principle of monarchy, and the restoration of internal stability in the countries of western Europe.

In certain regions—for example, in Mecklenburg, in Poland, and to a considerable degree in Hungary—the monarch failed in the attempt to discipline the nobles into the modern idea of the state. In other regions—particularly in Brandenburg-Prussia and in the Russia of Peter the Great (r. 1682–1725)—the ruler succeeded in turning the nobles into "servants of the state," but only by conniving with them in their oppression of the other classes of society, and by giving them governmental authority on their own estates. In these countries there developed on the basis of military needs a secular, utilitarian type of monarchy, more ruthless in its methods than the religious monarchy of Louis XIV. In general the peasantry and the townsmen to the east of the Elbe River suffered in the 17th century a continuation of that decline which had been taking place in the 16th century, so that their position and prospects were worse than they had been in medieval times.

ARTISTIC, INTELLECTUAL, AND RELIGIOUS LIFE

The Baroque.—The development of a "Catholic Renaissance" in France, the achievements of Catholic missionaries in all parts of the world, the wide establishment of the Jesuit order, and the victories of Count Tilly and Albrecht von

Wallenstein in the early stages of the Thirty Years' War all contributed to a feeling of exultation in Rome at the time when the new Basilica of St. Peter's, the "greatest architectural wonder of the world," had at last been completed. St. Peter's was consecrated in 1626 and remained the real center of artistic activity in Rome throughout the century. During the pontificate of Urban VIII (r. 1623–1644), as well as during the reigns of his two successors, Rome was turned into a baroque city, chiefly under the inspiration of the sculptor and architect Lorenzo Bernini (1598–1680) and the painter Pietro da Cortona (1596–1669), and the new style impressed its character on the city more profoundly than any previous one had done.

The baroque style, greatly patronized by the Jesuits, seemed to express the exuberance of the Counter Reformation, and it dominated European art for at least a century, spreading from Rome to Spain, Portugal, Austria, Catholic Germany, and Poland, although it had less influence in France and England. It was a dynamic style, seeking dramatic effects, and loading churches with ornament and gilding, colored sculptures, and sensuous curves. Behind it was a spirit which seems to have affected painting and poetry, giving therefore a certain unified character to the culture of the time.

Northern Cultural Leadership.—Culturally, the 17th century saw the end of the long period of Mediterranean leadership. In the closing decades of the century the remarkable advances that changed the character of Western civilization were centered about the English Channel. At the beginning of the century Spain was still enjoying her "Golden Age" in literature and the arts and even science, an age of great originality and of riotous individualism. The influence of Spain was quickly transmitted to the countries of western Europe, and had its part in the development of the famous culture of Versailles, the flowering of the arts in the reign of Louis XIV of France. At the beginning of the 17th century the genius of Galileo illustrated the important part still played by Italy in the world of science. In the second quarter of the century, Holland came into her "Golden Age" with a burgher culture which blossomed in literature and art, as well as in technology, so that she acquired an ascendancy particularly in the Protestant world and greatly influenced England, for example, and governments such as that of the Great Elector in Brandenburg-Prussia. The most remarkable transition in the history of Western civilization for over a thousand years, however, took place in the last quarter of the 17th century, at a time when the English, the Dutch, and the French—especially the French Huguenots—were bound together by a close system of intercommunications. They were building up a culture vastly different from that of the Renaissance or that of 17th century Spain or that of Louis XIV's court of Versailles. At this point in the story the success of the Scientific Revolution coincides with the palpable appearance of what we today would call the modern world.

The Scientific Revolution.—It would be proper to regard most of the 17th century as still medieval, for it represented a world and an outlook packed with what we should call archaisms. At its opening men still pictured the physical universe in general in the way they had been doing for a number of centuries. The Renaissance itself had had the effect of making all branches of thought more subservient to ancient Greece than had previously been the case. During most of the century, Scholasticism still prevailed in the universities and had sway even in the Protestant world. During most of the century, Aristotle was still the master in natural science, where the ancient syntheses and the ancient modes of explanation were still current.

A new star and a new comet in the later decades of the 16th century had shaken the bases of the ancient astronomy and made it difficult to believe that the planets were attached to crystalline spheres. The consideration of the problem of projectiles had created a similar disturbance in the ancient science of mechanics; for it was difficult to reconcile the behavior of cannon balls with the basic assumption of that science, the assumption that a body could not keep in motion unless its original mover kept on pushing it. These two fundamental problems in astronomy and mechanics became like levers which dislodged an ancient universe and installed a new one, transforming the methods of science and revolutionizing human society. But first there was a period in which the bases of science itself had to be completely re-examined, and the whole question of scientific method was overhauled in the work of Galileo Galilei (1564–1642), in the writings (published 1604–1629) of Sir Francis Bacon (1561–1626), and in the *Discourse on Method* (1637) by René Descartes (1596–1650).

A chain of inquirers from the time of Galileo and Johannes Kepler (1571–1630) pursued the crucial problems in astronomy and mechanics and gradually disengaged the problem of gravitation, until in the 1670's a host of scientists in both England and France were touching the fringes of the final synthesis and bringing the scientific movement to its most exhilarating period. Galileo's way of mathematizing a problem and producing a formula had been geared to a more economical and strategic use of the experimental method. The effects of gravity, the path of falling bodies, the orbits of the planets, the pull of the stone on the sling that swirls it round, the irregularities in the movements of the planets as they came into proximity with one another, the more accurate measurement of celestial distances—these were the homely elemental problems that were being studied, and the results of earlier work on them were being refined and correlated.

The century had seen various attempts to create vast mythical "systems of the universe" which were born out of high flights of philosophical speculation; but a humbler approach to the problem of nature now produced such results in its treatment of a few pivotal points as to revolutionize man's picture of the universe and change forever his views about the way in which the problems of the physical world should be tackled. One imagined the moon being attracted to the earth like a falling apple; but, if such were the case, why did it not drop completely into the earth? If, however, one imagined the moon as a stone swirling round the earth in an invisible sling, one could then ask whether the tendency of the moon to fall into the earth might not exactly counteract the tendency of the moon to press out of the sling, making a beeline into empty space.

It was Sir Isaac Newton (1642–1727) who worked out the correspondences, showed with what nicety the heavenly bodies were mathe-

matically balanced, and developed on these lines a vast synthesis which presented a new system of the skies. Mechanics and astronomy were fused into a comprehensive whole; things terrestrial and things celestial were now comprised in a single piece of explanation: one system of laws prevailed over the entire universe. For the first time science achieved a plausible and satisfactory explanation of a moving earth. For the first time the ideal to which so many of the 17th century scientists had been pressing—the ideal of a universe reduced to a species of clockwork—seemed within reach. The new developments in scientific method were vindicated. And in a single stroke Newton completed the overthrow of the authority of both the ancient world and the medieval.

If it was the concentration on two pivotal problems which set human thought on a new path, and if it was the development in mechanics and astronomy which changed the very character of natural science, other movements throughout the 17th century also helped to usher in a new scientific era. By 1600, Europe had at last appropriated and assimilated all that it had to learn from the scientific teaching of the ancient world. The 17th century saw the final example of the influence of ancient Greece; for the old atomic theory was not only revived but was given a form which made it tenable for Christians; and, as Bacon had predicted, it led to a more subtle feeling for the complexity of the internal structure of matter, it generated new types of hypothesis, and it facilitated the quest for a mechanistic explanation of natural phenomena.

The 17th century saw the development of the important elementary scientific instruments—the telescope, the microscope, the thermometer, the pendulum clock, the barometer, the air pump, followed by the blowpipe. Certain anatomical discoveries at different dates in Padua enable us to see how slow had been the transmission, establishment, and recognition of scientific discoveries in the 16th century. The development of the periodical press in the 17th century, the increased facilities for scientific correspondence, the foundation of scientific societies (which helped to finance experiments and to publish results), and the rise of public interest in the work of scientists transformed the whole system of scientific communication and greatly speeded up the European repercussions of work achieved in any locality. Technological needs, in such fields as shipbuilding, navigation, and hydraulics, gave a stimulus to many branches of inquiry.

If the universities resisted the new science a campaign was conducted against their ancient curriculum; other institutions provided centers for scientific research; and royalty patronized this work. Treatises were written in the vernacular and the appeal was made from the learned world to that new arbiter in the world of thought, the general reading public. Science was being popularized; for example, in 1686, the year before Newton's *Principia* transformed the system of the universe, Bernard Le Bovier de Fontenelle in France produced *The Plurality of Worlds*, a work which summed up the pre-Newtonian astronomy in a dialogue intended to be as diverting for fashionable ladies as the latest novel. The 17th century thus exhibited a great tidal rise of science, the effects of which were widely felt in the world at large.

Religion.—The medieval character of much of the 17th century is illustrated by the leading part which religion played in the culture and the politics of the age. This feature is apparent equally in the England of Archbishop William Laud and the England of Oliver Cromwell. Sometimes it appears more clearly after 1600 than in the previous 50 years, as in the case of the remarkable "Catholic Renaissance" in 17th century France. Under these conditions, political theory itself was generally conducted within the framework of ecclesiastical thought; and it is within such a framework that we have to consider Richelieu's doctrines of government as well as the conception of monarchy which was current in the France of Louis XIV. Also it was within such a framework that there emerged a conception of *raison d'état* which became significant in the 17th century.

Toleration, which in the 16th century had been not an ideal but rather a compromise—a recognized departure from the ideal, even sometimes a mere measure of *Realpolitik*—established itself more genuinely as a religious principle amongst some of the sects of the 17th century. It was only gradually, however, that even the various branches of Protestantism learned to tolerate one another. And if freedom came to be enlarged during the course of the 17th century this was partly due to war-weariness and the rise of religious indifference, and partly to the desire of rulers to retain or recruit populations for purposes of economic recovery.

Because it kept watch over the general mundane interests of society instead of merely behaving as the servant of one church against another, the state tended to emerge above the rival faiths and these latter tended to be viewed rather as mere parties within the state. The secular government increased its authority and emerged as the effective umpire or arbiter. The older idea of the nation as a religious society was giving way, as the century proceeded, to the modern conception of the secular state.

Christianity itself came into a state of unusual weakness in the closing decades of the 17th century, perhaps because the religious conflicts had been too bitter and the fanaticism had been too intense. The scientific movement had come to its climax in Sir Isaac Newton without making any essential breach with religion; but the traditional religious outlook, like the traditional university teaching, had tended to lose credit in the accompanying controversies. Christianity also lost one of its great incidental supports in the general overthrow of authority that occurred, the discrediting of the customary appeal to the teaching that had been handed down from the past.

Protestantism was better able to adapt itself to the new intellectual outlook than Catholicism; for even over a vast range of mundane matters independent of essential dogma the Catholic system had become more hardened in its tradition. But if the Catholics set their faces too firmly against the intellectual movements of the time, the Protestants sometimes made too swift an alliance with the essentially mechanistic outlook that the 17th century had been developing. When it recovered its power again, Protestantism itself was transformed, becoming the more liberal and rationalizing system which has been familiar in the more recent centuries, radically unlike the Protestantism of the 16th and much of the 17th century. Newton's achievement was to become

(against the wish of Newton himself) the basis for a completely mechanistic view of the universe; and it was to be of some moment that the churches at the end of the 17th century were not in the best condition for meeting the challenge of the new science.

SOCIAL AND ECONOMIC LIFE

Secularization and the New Bourgeoisie.—Partly for this reason, the transition to the modern world is marked by a widespread process of secularization in society, in politics, and in all the realms of thought. The Scientific Revolution assisted this process, for its apostles had long been claiming that the methods of the new science could be transferred not merely from physics to chemistry and biology, but from the natural to the human sciences—to history, anthropology, politics, economics, and comparative religion. Here, too, the teaching of the past now lost its authority amongst a wide reading public; while in France, Holland, and England more scientific forms of inquiry, more methodical reference to statistics, and a more systematic collection of information affected the conduct and even the machinery of government.

Before the end of the 17th century "the age of reason" had opened, the age of the French *philosophes* had begun. The results of the Scientific Revolution were being turned by literary minds into a new world view, a new attitude to life. Men were becoming aware that they now possessed a power of changing their environment, even those aspects of it which they had hitherto been disposed to regard as providentially ordained. And a world which had long believed that the Golden Age lay in the distant past and that human societies and civilizations suffered from a natural process of decline began to see a future that opened out to wider horizons and indefinite improvement. The transition to the idea of progress had begun.

The process of secularization covered a wider area than could be accounted for by the Scientific Revolution alone. It would seem to have been the natural accompaniment of the development of a more urbanized society in the countries around the English Channel. Not only in Holland, which saw the flowering of a burgher civilization, but also in England and in the France of Louis XIV, we see the bourgeoisie coming into the ascendancy in this period. This class produced that new arbiter in the world of thought, the general reading public, and the leaders of the scientific movement appealed from the learned world and the church to this new arbiter. It was the section of society least submissive to tradition, least ready to accept mystery or mystification, and most apt to follow a worldly minded common sense. To meet its needs, literary style, which had been so ornamental, was pruned into simplicity and directness, as the scientists wished and as the Royal Society of England had wanted.

Trade and Competition.—As at the time of the Renaissance, the region which held the cultural leadership and which decided the character of the succeeding age was also the region which was the most economically advanced. The expanding markets, provided partly by the New World and partly by the large-scale needs of greatly expanding armies, had given great stimulus to economic advance, and in Holland, England, and France the overseas trade now came to assume great proportions. Holland had taken the lead in the movement and for a time was the chief shipping, trading, manufacturing, and financial country in Europe. Amsterdam was the commercial and financial capital of the continent, the Dutch East India Company having been founded in 1602, and the famous Bank of Amsterdam in 1609. In 1636–1637 the tulip mania brought out in Holland that crisis of frenzied speculation to which England and France were moving by the end of the century, a crisis which a little later culminated in England in the South Sea Company and in France in the Mississippi Bubble (qq.v.). The closing decades of the 17th century saw bitter economic conflict between the three leading countries, England, Holland, and France; and it seemed that the wars of religion which had ended in 1648 were to be followed by wars of trade.

The Changing World.—The promoters of natural science throughout the century insisted on the utilitarian importance of science and on the possibilities of its practical application. Both in agriculture and in industry this led to a more methodical study of processes and materials, a closer concentration on the means by which technological progress could be achieved. What we call the Scientific Revolution of the 17th century and what we have often seen as the Agrarian Revolution and the Industrial Revolution of the 18th century, were in reality proceeding together in the period of 1601–1700. It is impossible to disentangle these strands of intellectual and social change or to say that any one of them would have reached the importance which it actually achieved if the others had not been proceeding at the same time.

In reality, though, it was not merely science and man's attitude to the world that were changing, but the world itself that was being transformed before man's eyes. A static environment which had looked much the same for thousands of years was now developing so quickly that the change was visible to the naked eye. Men began to see that they were living in a dynamic society. In Holland, England, and France, the developments in finance and speculation were altering the structure of the state itself; and we see this particularly in the great war of 1689–1697, between William III and Louis XIV, a war which was in part a conflict between financial systems.

See also ABSOLUTISM; ASTRONOMY, HISTORY OF; BAROQUE; BAROQUE ARCHITECTURE; BAROQUE MUSIC; CARTESIANISM; COLONIAL WARS IN AMERICA; DUTCH WARS; EAST INDIA COMPANIES; EDICT OF NANTES; EXPLORATION IN AMERICA; GRAVITATION; HUGUENOTS; KEPLER'S LAWS; PURITANISM; TELESCOPE; THIRTY YEARS' WAR; also the historical and cultural sections of the various country articles and the relevant biographies.

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PRINCIPAL EVENTS OF THE 17TH CENTURY

1607—Foundation of the colony of Virginia.
1609—Letter of Majesty concedes Bohemian religious privileges.
1610—Discovery of Hudson Bay.
1613—Advent of Romanov dynasty in Russia.
1618—Outbreak of Bohemian Revolt and Thirty Years' War; opening of Synod of Dort (Dordrecht).
1620—Pilgrim Fathers land in New England; Francis Bacon's *Novum Organum.*
1624—Cardinal Richelieu becomes first minister in France.
1629—Edict of Restitution confiscates ecclesiastical land acquired by Protestants and brings the Thirty Years' War to a climax.
1637—René Descartes' *Discourse on Method.*
1642—Opening of the Civil War in England.
1648—Treaty of Westphalia.
1649—Execution of Charles I.
1660—Restoration of Charles II. The tide turns in favor of monarchy in Europe.
1661—Beginning of Louis XIV's personal rule.
1683—Siege and relief of Vienna; the turning of the tide against the Turks.
1685—Revocation of the Edict of Nantes.
1687—Sir Isaac Newton's *Principia.*
1688—The Glorious Revolution in England.
1693—Establishment of the National Debt.
1700—Death of Charles II of Spain, leading to the War of the Spanish Succession; beginning of hostilities in the Great Northern War.

SEVENTH CENTURY. Of all periods of history the 7th century of the Christian era seems at first glance most to deserve being called the dark age. In western Europe the cultural achievements of the great transmitters of ancient learning in the 6th century were fading into intellectual sterility. Pope Gregory I the Great (r. 590–604) marked the transition in his apparent condemnation of the study of classical letters and his abject surrender to the miraculous. Although he revived the papal authority and asserted it *urbe et orbe,* the unity of Latin Christendom could still succumb, as the old Roman political unity had done already, to the particularism of the barbarian kingdoms. These Germanic kingdoms showed little promise of rebuilding the Pax Romana and its universal law and order. The Lombards (q.v.) having divided Italy were unable to make it whole again. In Gaul and southern Germany the Merovingian rulers of the Franks (q.v.) became "do-nothing kings" (*rois fainéants*), their kingdom almost in dissolution. Anglo-Saxon England was a congeries of kingdoms frequently at war with each other. Spain, a united kingdom under the Visigoths (q.v.), nonetheless suffered from internal weaknesses that were soon to bring destruction. In these circumstances the change, long since evident, toward an agrarian economy, society, and culture was proceeding toward completion, bringing to an end the urban civilization of antiquity.

If in the eastern Mediterranean world the Roman Empire had survived the first onslaughts of German tribes and Asiatic hordes, and under Justinian had enjoyed in the previous century a revival of power and cultural brilliance, it was now in the 7th century meeting with disaster. Under repeated attack from barbarian tribes of Slavs and Avars (qq.v.) in the Balkans, and from the more civilized peoples of western Asia, the empire (now Greek, Byzantine, as well as Roman) was almost continuously fighting for its life. The end of the Roman Empire and the ancient Mediterranean civilization seemed to be at hand.

Age of Transition.—Such a picture of gloom, however, is not a just representation of the century. Although a period of decline, the 7th century was also one of transition, of further change from the old to the new in the great and continuous process of history. It was, in fact, a time of political, religious, economic, and cultural movements of vital importance to the development of the ancient Mediterranean into the European civilization of the Middle Ages and the modern world. The Byzantine Empire, fighting valiantly for its life, not only survived—a notable success in such an age—but in surviving became the center from which Graeco-Roman culture and Greek Christianity spread later among the Slavic and Asiatic peoples of the Balkan Peninsula and of Russia. Its active economic life was to aid in the revival of trade and industry in the West. Meanwhile a vast offensive and creative movement developed in the southwestern quarter of Asia and across North Africa. A great new religion, Mohammedanism, arose, and it inspired the leadership of the Arabs in that amazing religious-political-economic imperialism which produced a new world power, and a new version of the old civilization. Islam. Successor to much of the Graeco-Roman heritage as well as to the Asiatic, Islam was instrumental in restoring the unity of the Mediterranean world; and by bringing Greek and their own learning into Spain and Sicily the Moslems were soon to be an important civilizing force in western Europe. In the Far East, Buddhism was again important in China, and during the 6th century it had spread into Japan, which was entering the realm of history. Under the T'ang dynasty the Chinese Empire and Chinese culture enjoyed a golden age of high achievement. Even in the West some creative activity was taking place: first from Ireland and then from Rome, Latin Christian missionary activities resulted in the conversion of the Germanic invaders of Britain, the organization of the English church, the foundation of new centers of learning, and the beginnings of Latin, Roman Christianity and culture in Holland and Germany.

Among all these movements the most important for the future of European civilization were undoubtedly the defense of the Byzantine Empire and the aggressive expansion of western Asia in the rise of Islam.

DEFENSE OF THE BYZANTINE EMPIRE

The ancient Roman Empire had been shattered in the West by the Germanic invasions and weakened in the East by the revived power of Persia under the Sassanids. The efforts of Emperor Justinian (r. 527–565) to regain what had been lost were rewarded with success in Italy, North Africa, and southern Spain. But the reconquest so devastated Italy that the Lombards were able to occupy the valley of the Po (Lombardy) and the Apennines, the empire retaining isolated territories, Venice, Ravenna, Rome, Naples, the southern tip of Italy, and Sicily. More unfortunate still was the consequence for the empire in the East, for the military effort in Italy had entailed the weakening of the eastern frontiers. The Slavs were pushing into the Balkans

and Greece, while an Asiatic horde, the Avars, who had settled in the plain of Hungary, repeatedly threatened Constantinople. Meanwhile Persia was generally on the offensive. Yet the able Emperor Maurice (r. 582–602) had checked the Persians and defeated the Avars and Slavs when a mutiny of his army on the Danube and an uprising in Constantinople ended his life and resulted in new disasters in the reign of his successor, the brutal Phocas (r. 602–610). Factional strife rent the great cities of the empire, and King Khosrau II Parvez of Persia occupied Roman Armenia, Mesopotamia, and Syria.

Victories of Emperor Heraclius.—Salvation came from Emperor Heraclius (r. 610–641), who obtained the throne when a rebellion started by his father against Phocas ended in success. But for several years longer the empire had to endure continued misfortune, renewed raids of Slavs and Avars, the capture by Khosrau of Jerusalem and the Holy Cross (reputedly the original cross on which Christ had suffered), and the Persian conquest of Egypt.

Then, aided by a great emotional response and crusading spirit in the name of the Mother of God, and by the loans (with interest) of the church and the leadership of Patriarch Sergius, Heraclius waged continuous war against the Persians while Sergius and the magister Bonus brilliantly and finally defeated the Avars in their attempt to capture Constantinople (626). Heraclius in 628 reached the heart of the realm of Khosrau, and recovered the Holy Cross, which was piously returned to Jerusalem, except for fragments given to the Armenians or brought back to Constantinople.

Once more the Byzantine Empire had survived, largely because of the genius of Heraclius. But the effort against Persia and the Avars had been exhausting, and Persia itself was disastrously weakened. The inevitable high taxes for the costs of war and loans to the church aroused dissatisfaction.

Religious Controversy and Reaffirmation.—More serious, perhaps, was the strong opposition to the orthodox empire and official church of the Monophysites (q.v.), who dominated Egypt and Syria. Since the 5th century the Monophysites, believing in the one, divine nature of Christ, had refused to accept the doctrine of the divine and human natures as defined by the Council of Chalcedon (451), for their monotheism was suspicious of anything that seemed to weaken the divine unity of the person of Christ. Patriarch Sergius and Heraclius in the edict *Ekthesis* (638) proposed as a compromise the doctrine of one divine will (monotheletism) in the two natures. Rejected by both sides, the doctrine of the Monotheletes (q.v.) in any case came too late to serve the purpose of regaining the loyalty of Egypt and Syria. Finally, in 680–681, when these provinces were irretrievably lost, the Council of Constantinople reaffirmed as orthodox the old doctrine of the two natures of Christ. But religious dissension had split and helped destroy the power of the empire in the Near East. These troubles explain why not even the ability of Heraclius, had his health remained, might again succeed in the defense of the empire against a new enemy, the Arabs.

RISE OF ISLAMIC CIVILIZATION

In the epic ebb and flow of the history of the relations between Europe and Asia the Persians had failed to end the long Graeco-Roman-Byzantine hegemony over Asia Minor, Syria, and Egypt that had begun with the conquests of Alexander the Great. Now, however, the internal weaknesses of the empire and the crippling of Persia opened the Fertile Crescent to a people who were ready to seize their opportunity—as they had done many centuries earlier. Inspired by a great religious leader, Mohammed (570–632), by their zeal to convert other peoples to the new universal faith, and by the lust for rich conquests, the Arabs became a great militant force and in the declining years of Heraclius embarked on their phenomenal career of religio-political imperialism.

Nature of Islam.—Mohammed, claiming divine inspiration, preached a religion founded on the belief in one God (Allah) and in Mohammed as his prophet. His teachings included an improved moral and social code for the Arabs (for example, forgiveness of enemies, sobriety, and a moderation of polygamy), as it included the reward of paradise for all Moslems (the faithful, or "self-surrenderers") who practiced the virtues commanded, offered prayers daily in the direction of Mecca, observed the annual fast of Ramadan, made the pilgrimage to Mecca, and fought for the faith. The new religion was called Islam ("surrender"), and Islam came to mean the ensemble of Moslems and their civilization. Mohammed's sayings were soon embodied in the suras (chapters) of the Koran (q.v.), the sacred book of Islam.

Expansion of Islam.—The success of the new religion was not immediate. But after the flight (hegira) in 622 from Mecca to Yathrib (Medina), Mohammed and his followers rapidly won numerous converts by defeating and plundering Meccan caravans and armies, gained control of Mecca in 628, and were unifying Arabia by the time of his death. Thereafter, within ten years, under able generals like Khalid and Amr ibn-al-As, the Arabs destroyed the army of Heraclius (Battle of the Yarmuk, 636) and occupied Syria, Palestine, and Egypt (Alexandria fell in 642); and they captured Ctesiphon and began the conquest of Asia eastward to the Oxus (Amu Darya) and Indus rivers. By the end of the 7th century, under the Umayyad caliphs of Damascus, the Arabs had completed the conquest of North Africa (Carthage finally fell to them in 698) from Libya to the Pillars of Hercules; and in a few years the converted Moors overthrew the Visigothic kingdom and occupied most of Spain.

Civilization of Islam.—From central Asia westward to the Atlantic, under the authority of the caliphs, the civilization of Islam came into being. If Arabic was the universal official and literary language, the learning of Islam came from the conquered peoples, and thus the new civilization incorporated the ancient Mediterranean learning (the Greek above all, with borrowings from India and China), and transmitted it to the West. Although it began as a reaction against Europe, and Moslem and Christian hostility often recurred, Islam carried on to new heights the unity of the old Mediterranean civilization; Mohammedanism itself was a part of the Semitic religious movements that had brought forth Judaism and Christianity, and in turn it too was influenced by Greek philosophy; there was no deep conflict between East and West, between Asia and Europe.

BYZANTINE AND ARABIC CULTURAL AND ECONOMIC LIFE

Despite the first overwhelming sweep of the Arabs, the Byzantine Empire was able to survive. Constans II (r. 641–668), defeated by the Arabs in the East, spent most of his time in Italy and Sicily. The opportune invention of Greek fire, however, gave the Byzantines control of the seas in time to beat off the Moslem fleet and save Constantinople (677). But with the Arabs remaining a threat to the capital and to Asia Minor, a new danger appeared in the settlement of the Hunnic Bulgars across the lower Danube. Yet the military strength of the empire, based on the reforms of Heraclius and the successful defense of the capital, resulted in the survival of Constantinople (once more in 717–718, when Leo III the Isaurian beat off the Arabs) as the mighty fortress defending Europe on the east, and as the center of Greek civilization from which Greek letters and Greek Christianity were to help in civilizing Russia, and an active economic life was to help in the later revival of western Europe.

Preservation of Ancient Learning.—In their different ways, therefore, Byzantines and Arabs during the 7th century preserved the ancient Mediterranean civilization and prepared the way for its development, when it entered the West, into medieval European civilization. Most of the creative work in this process would be done from the 9th to the 13th centuries. But Greek classical literature and learning at least survived and were studied in the Byzantine Empire, and Maximus the Confessor (580?–662) by popularizing the Pseudo-Dionysius' Neo-Platonic works on angelology helped increase the mystical element of Greek Christianity and, indirectly, of Jewish and Moslem thought. The invention of Greek fire (probably a mixture of quicklime, naphtha, pitch, and sulphur—with perhaps saltpeter, too) was a sign of continuing Greek technological genius. Already Greek philosophy, mathematics, and science had penetrated western Asia, and many of the works in these subjects were being translated into Syriac by Nestorian Christians in Syria, Mesopotamia, and Persia. The Syriac versions were later to be translated into Arabic.

Meanwhile, in the 7th century, Hindu mathematics reached a high level with the work of Brahmagupta (588–?660). The so-called Hindu numerals were even now appearing in Mesopotamia, where Severus Sebokht (fl. 650) was acquainted with them. This scholar was also a student of Aristotelian philosophy. Thanks in part to him, Islam was destined to absorb, build on, and transmit Greek and Hindu knowledge.

Economic Life.—Like the cultural life of the century in the Near East, the ancient economic life continued to exist, if it did not always flourish because of war and raids. But the Arabs and their subjects in Syria and Egypt and North Africa soon expanded trade between Asia and the Byzantine Empire and Spain. At times there was some interruption of the old commerce between the eastern Mediterranean and western Christendom, but internal troubles were a more important factor in the continuing economic decline in Italy and in Gaul. In fact, along with the Byzantines, the Arabs renewed the economic unity and prosperity of the Mediterranean world and in a few centuries stimulated the revival of trade and industry in the Latin West.

WESTERN DISUNITY

Localism in Western Europe.—No such continuity of the ancient world was apparent in the western half of the Roman Empire. Italy in the 7th century was itself divided between the loosely knit Lombard kingdom and the scattered territories of the Byzantine Empire. A renewal of Greek culture in Sicily and the extreme south came with the settlement of many refugees from Greece and the East. The Lombard kings were not strong enough to conquer the whole peninsula, papal Rome in particular being a serious obstacle. The hardening of this localism in the 7th century explains why no power could make Italy more than a geographical expression until the 19th century.

As for the Roman Church, the achievements of Pope Gregory I the Great in the preceding period resulted in the survival of the papal control of the territory that was the nucleus of the later Patrimony of Peter or Papal States. The popes held firm in doctrinal disputes with the patriarchs of Constantinople and the emperors, and their staunch adherence to the doctrine of the two natures of Christ won a definitive victory at the Council of Constantinople in 680–681. They did not, however, secure recognition as superior to the patriarchs of Constantinople, and ultimately the great schism of the Eastern and Western churches resulted.

The kingdom of the Franks in Gaul and the valley of the Rhine was in danger of falling to pieces as the Merovingian dynasty was weakened by the power of the nobles and the loss of crown lands and revenues. Dagobert I (r. 628–638) enjoyed great prestige but was the last of the line to rule more than nominally over the realm as a whole. The chief administrative officer of each division of the kingdom, the mayor of the palace, was becoming the actual ruler. One of these mayors, Pepin of Herstal, in his victory at Tertry (687) won virtual control of the whole kingdom. His son, Charles Martel, in 732 repelled the Moors of Spain and was the founder of the great Carolingian dynasty.

In Spain the Visigothic kings were trying to establish a real public authority and a strong state. Indeed, the memory of the unity of Spain under these kings contributed to the rise of the tradition of an independent Spanish empire, and a feeling of Spanish nationalism, during the reconquest from the Moors. Yet the monarchy was dominated by the clergy; and the dissatisfaction of great nobles and the unhappiness of the persecuted Jews soon made Visigothic Spain an easy prey for an invading Moslem force (711).

Roman Britain had disappeared. The native British were pushed into the extreme west or across the channel into Armorica (hence Brittany), and the several kingdoms of the Germanic Angles, Saxons, and Jutes showed as yet no promise of the unity that later became England.

Forces of Unity.—Altogether, then, in western Europe the localism introduced by the Germanic invaders became permanent and defeated medieval efforts to revive the Roman ideal of political unity; the final outcome was nationalism. Yet some of the common Roman heritage in institutions and law was vaguely reappearing in these barbarian kingdoms. Frankish, Lombard, and Visigothic kings tried to rule with the old authority that Roman emperors had enjoyed, and to revive the idea of a public law and state superior to tribal distinctions and private rights.

The *Edictus* (643) of the Lombard king Rothari (r. 636–652) asserted the royal power and codified the law. King Receswinth (r. 649–672) in Spain issued a codification of the Roman and Visigothic laws (the *Liber Judiciorum,* 654), thus replacing the Germanic personality of the law with the Roman ideal of a body of law common to all within the state.

But the Roman heritage survived and spread above all through the missionary strength of Latin Christianity. Latin, and even Greek, learning and literature had been flourishing in Irish monasteries, and by 615 Irish monks had carried their Christianity and Latin letters into Scotland, Northumbria, Bavaria, Gaul, and northern Italy; St. Columban (543–615) founded the monastery of Bobbio (c.612), where the monks began the study of books that came from the old library of Cassiodorus. The bishops of Rome, however, now became the chief leaders of the movement. In 597, Gregory the Great began the papal policy of sending Benedictine monks from Rome to convert the Angles and Saxons to Roman Christianity. Gradually Benedictine monasticism superseded the Irish, and at the Synod of Whitby (664) the Irish accepted Roman practices (the dating of Easter and the tonsure of priests) and the authority of the popes. The unity of the Roman Church was firmly established. In 668, Pope Vitalian (r. 657–672) appointed a learned Greek scholar, Theodore of Tarsus, archbishop of Canterbury, who began the organization of the English church. At the same time the African abbot Hadrian made Canterbury an important center of Latin learning, and Benedict Biscop founded the famous schools of Jarrow and Wearmouth. By the end of the 7th century, finally, Anglo-Saxon monks were the successors of the Irish in missionary work on the Continent. Aided by Pepin of Herstal and Charles Martel, who wished to extend the power of the Franks, Willibrord and Winfrid (St. Boniface) began the conversion of Frisia (Holland) and Germany. The monasteries and churches founded by them and their disciples hastened the rise of an active agricultural life as well as learning, and the entrance of Germany into the world of Roman civilization.

Western Intellectual and Artistic Life.—The religious and cultural unity of western Europe was now at hand, but as yet creative efforts in literature, learning, and the arts were poor and unoriginal. Archbishop Isidore of Seville (560?–636), however, compiled an encyclopedia (the *Etymologies*) which reveals an extensive knowledge, still possible in Spain, of all fields of the learning that had survived about the world and man, about Christian doctrine, the Latin language and grammar, medicine, law, the natural sciences, and technology. The encyclopedia is elementary, but it became the standard work of reference in medieval education. In Ireland and Anglo-Saxon England the Latin poetry of monks like Aldhelm (640?–709), though not great literature, reflected a competent knowledge of the classics. An anonymous treatise, *On the Twelve Abuses of the Age,* offers an intelligent discussion of the duty of the king to protect the weak, rule according to law and justice, and maintain the common welfare. Anglo-Saxon literature began with Caedmon's *Hymn of Creation,* based on the Biblical story, and, possibly, with the first Germanic epic, *Beowulf* (q.v.), although some scholars place the latter as late as the 10th century. Meanwhile, the schools of Wearmouth and Jarrow were educating Bede (673–735), whose mature Latin scholarship leads into the 8th century and the Carolingian renaissance.

Rome had stopped at the Rhine and the Danube. Barbarian kingdoms, even trade and piracy, and above all Irish, Roman, and Anglo-Saxon missionaries extended the universalism of Rome to northern Europe and thus limited the extreme particularism of politics, languages, and customs. Indeed, by the end of the 7th century, Latin Christianity and civilization were the one unifying force in all western Europe. Stemming from Rome in western Europe, from Constantinople in eastern Europe, from both and from Islam in Europe as a whole, the ancient Mediterranean civilization was about to become European.

See also BYZANTINE EMPIRE; CALIPHATE; CAROLINGIANS; CONSTANTINOPLE, COUNCILS OF; IRISH CHURCH HISTORY; ISLAM; LATIN LITERATURE OF THE MIDDLE AGES; MIDDLE EAST—*Birthplace of Islamic Civilization;* MIDDLE EAST—*The Arab Caliphate: Its Rise and Decline;* MOHAMMEDAN ART; MOHAMMEDAN LITERATURE; also the historical and cultural sections of the various country articles and the relevant biographies.

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PRINCIPAL EVENTS OF THE 7TH CENTURY

604—Death of Pope Gregory I the Great.

618—Beginning of the T'ang dynasty in China and a brilliant period of Chinese culture.

622—The flight (hegira) of Mohammed from Mecca to Yathrib (Medina).

628—Emperor Heraclius victorious over Sassanid Persia.

628–638—Dagobert, last important Merovingian king of the Franks.

636—Death of Archbishop Isidore of Seville; decisive defeat of the Byzantine army by the Arabs in the Battle of the Yarmuk, and Arab conquest of Syria follows.

641—The Arabs complete the conquest of the Persians.

642—The Arabs take Alexandria and complete the conquest of Egypt.

643—*Edictus* (Lombard code of law) of Rothari.

654—The *Liber Judiciorum,* code of Roman-Visigothic law for Spain.

664—Council of Whitby; unity of Irish and Roman Christianity under the papacy assured.

669—Theodore of Tarsus, archbishop of Canterbury, arrives in Britain and begins to organize the English church under the authority of the Roman Church.

677—Greek fire and Byzantine seapower assure successful defense of Constantinople and the empire against the Arabs.

680–681—Sixth ecumenical council at Constantinople and final triumph of doctrine of the two natures of Christ.

687—Battle of Tertry; Pepin of Herstal as mayor of the palace acquires control of the Merovingian kingdom of the Franks.

698—The Arabs capture and destroy Carthage, completing conquest of North Africa.

SEVENTH-DAY ADVENTISTS, an evangelical denomination having its origin in 1844, when a New Hampshire congregation, connected with the Advent Movement, began observing the seventh day as the Sabbath. They believe in the imminent premillennial return of Christ; that immortality is a gift through Christ; that the living righteous will be translated and the righteous dead resurrected at the Advent; and that all the wicked will ultimately be destroyed. They emphasize Bible prophecy, and believe in the gift of prophecy. Their tithes and offering for 1952 totaled $52,240,980, and their foreign mission budget for 1953 was $18,562,822. They conduct 269 colleges and secondary schools, 43 publishing houses, issuing nearly $14,000,000 worth of literature in 197 languages, and operate 108 sanitariums and hospitals and 57 dispensaries. Their headquarters is in Washington, D.C. At the close of 1951 their churches numbered 10,585, with a membership of 803,720.

SEVENTH DAY BAPTISTS. See BAPTISTS.

SEVERINUS, sĕv-ĕr-ē′nŭs, **Saint,** the Apostle of Norica: b. either in northern Africa or southern Italy; d. Jan. 482. After the death of Attila in the 5th century he journeyed through the territory along the Danube, preaching Christianity, and through his courage and good work gained great influence over the people and made many converts.

SEVERN, sĕv′ĕrn, **Joseph,** English artist: b. Hoxton, Dec. 7, 1793; d. Rome, Italy, Aug. 3, 1879. He was self-taught and won, after great struggles, the Royal Academy historical painting prize in 1818. Early in life he formed a friendship with the poet Keats, for which he is chiefly noted; in 1820 accompanying the poet to Italy, and caring for him there until Keats' death the following year. He painted several portraits of Keats. In 1821 Severn exhibited *The Death of Alcibiades* at the Royal Academy and won a traveling pension. He subsequently served as British and as Italian consul at Rome, where he lived until his death, devoting his time chiefly to the painting of miniatures.

SEVERN, England, the second river in size and most important in the country, rises at Maes Hafren in Montgomery County, and after a winding course of about 200 miles falls into the Bristol Channel. The Vyrnwy enters the Severn on the Shropshire borders, the Wye, below Chepstow and the Lower Avon about eight miles below Bristol. At Welshpool the Severn begins to be navigable, about 178 miles above its mouth.

SEVERO, sā-vā′rō, or **NORTHEAST CAPE.** See CHELYUSKIN, CAPE.

SEVERUS, sę-vē′rŭs, **Alexander.** See ALEXANDER SEVERUS.

SEVERUS, Lucius Septimius, Roman emperor: b. near Leptis Magna, Africa, 146 A.D.; d. York, Britain, 211 A.D. After the murder of Pertinax, in March 193 he was proclaimed emperor by his troops at Carnuntum. Thereupon he marched to Rome to crush the partisans of Didius Julianus, who had meanwhile purchased the imperial purple from the Praetorians. On his approach Julian was deserted and assassinated by his own soldiers. In professing that he had assumed the purple only to revenge the death of the virtuous Pertinax, Severus gained many adherents and was enabled to banish the Praetorians. But while he was victorious at Rome, Pescennius Niger was in the East at the head of a powerful army, by which he also had been called to the purple. Getting rid of the rivalry of Albinus by conferring upon him the title of Caesar, Severus at once directed his arms against this eastern competitor. On the plains of Issus, Niger was totally ruined by the loss of 20,000 men (194). After devastating some territory beyond the Euphrates. Severus took Byzantium, which had shut her gates against him, but only after a protracted siege (196); and he then returned to Rome, resolved to destroy Albinus. He attempted to assassinate him by his emissaries, but when this failed, Severus had recourse to arms, and defeated Albinus near Lyons (197). After returning to Rome Severus marched into the East to repel an invasion of the Parthians. From Parthia he marched toward the more southern provinces of Asia and entered Alexandria. A rebellion in northern Britain called him away again in 208. After penetrating to the far north of Caledonia, and losing a vast number of men, he returned southward and rebuilt or repaired the wall of Hadrian across the island from the Tyne to the Solway Firth.

Consult Platnauer, M., *The Life and Reign of the Emperor Lucius Septimius Severus* (Oxford 1918).

SEVERUS, Wall of. See HADRIAN'S WALL.

SEVIER, sĕ-vēr′, **John,** American pioneer: b. Rockingham County, Va., Sept. 23, 1745; d. near Fort Decatur, Ga., Sept. 24, 1815. Having founded the town of Newmarket, Shenandoah County, Va., and there become a celebrated Indian fighter, he served as captain in the Virginia line during Lord Dunmore's War (1774; see COLONIAL WARS IN AMERICA). He had removed in 1772 to the Watauga colony on the western slope of the Alleghanies and been, next to John Robertson (q.v.), the most prominent of the settlers. Now, at the beginning of the Revolution, he drafted a memorial to the legislature of North Carolina, requesting annexation to that colony, and as a result all of the present Tennessee was made a county of North Carolina and known as Washington district. He served in the North Carolina legislature and was appointed district judge at Watauga. Elected colonel of the trans-Alleghany forces, he commanded in many Indian fights, distinguishing himself at Boyd's Creek (1779) and King's Mountain (1780). After the war, North Carolina found that the retention of the large section now known as Tennessee would entail obligations for a corresponding portion of the Federal debt and, therefore, the tract was made over to the central government. The settlers then determined to organize an independent State and regularly apply for admission to the Union. At a convention held Aug. 23, 1784, Sevier was elected governor of the new State of Franklin, as it was called. North Carolina now recognized its mistake and granted Watauga a Superior Court, besides organizing the militia troops into a brigade with Sevier as brigadier. But Sevier entered office as governor March 1, 1785, reorganized the military, established a Superior Court and con-

cluded treaties with the Cherokees. In 1787 North Carolina declared the Franklin government a revolt, subdued it by force of arms, imprisoned Sevier, and ceded the region to the federal government. In 1796 Sevier was elected first governor of the new state of Tennessee. He served six terms (1796–1801 and 1803–1809). He was elected to Congress in 1811 and died while in office.

Consult Driver, Carl, *John Sevier* (Chapel Hill, N.C., 1932).

SEVIER LAKE, sĕ-vēr′, lake, Millard County, west-central Utah, altitude 4,600 feet. At one time second in size only to Great Salt Lake among the residual salt lakes left by the Pleistocene Lake Bonneville, it has been greatly reduced by large-scale diversion for irrigation of its only major affluent, the Sevier River, which enters it from the north. At its highest modern stage, in 1872–1873, Lake Sevier was 28 miles long and 10 miles wide, with an area of 188 square miles. Now it has more the character of an enormous salt marsh. In dry years much of its bed is incrusted with salt deposits, principally sodium chloride, sodium sulphate, and magnesium sulphate. The lake has no present outlet, but at an earlier stage in the recession of Lake Bonneville it drained north into Great Salt Lake; the old river bed is still discernible.

The Franciscan fathers, Silvestre Vélez de Escalante and Francisco Atanasio Dominguez, were told of the lake by the Indians during their exploration of 1776. It was early known as Lake Miera or Lake Buenaventura; under the latter name it became confused in cartography and legend with Great Salt Lake. Its present name derives from the Spanish Severo, corrupted by American trappers to Sevier. The first recorded visit to the lake by white explorers was by a party of fur hunters which included the American trapper Daniel T. Potts, early in 1827.

SEVIGNE, sā-vēn-yā′, Marquise de (Marie de Rabutin-Chantal), French literary figure: b. Paris, France, Feb. 5, 1626; d. Grignan, Drôme, April 17, 1696. She was the daughter of the Baron de Chantal, was left an orphan at the age of six, and was reared chiefly under the guidance of her uncle, the Abbé of Livry. She was married in 1644 to the Marquis Henri de Sévigné, who was killed in a duel in 1651, leaving her the mother of a son and a daughter. Her wealth, beauty, talent, and social position brought her offers of marriage, but she devoted herself, rather, to her children, to reading, and to the brilliant social and literary circle of the Hôtel Rambouillet in Paris. She was deeply attached to her daughter, who in 1669 married the Comte François de Grignan and shortly afterward accompanied him to Provençe, where he had been appointed lieutenant governor. This separation resulted in the voluminous correspondence which, while not intended for publication, has been given to the world and has made Mme. de Sévigné famous as a personality, as a literary stylist, and as a recorder of the social life of the resplendent court of Louis XIV.

The bulk of Mme. de Sévigné's 1,700 letters cover the seven year period following her separation from her daughter. (Later in life they were rarely apart.) The correspondence abounds in delightful gossip, witty anecdote, clever remarks on men and topics of the day, and graceful delineations of the pleasures and the gaieties of Parisian society. They mirror the life of the woman who was in turn the noted court beauty, the brilliant wit of the Hôtel Rambouillet, the religious devotee, the woman of business endeavoring to meet the demands placed on her income by her extravagant son, the appreciative student of the Latin and French classics, and always the devoted mother, deploring the separation from her daughter.

The letters were published first in 1726. Definitive is Louis J. N. Monmerqué's revised edition (14 vols., Paris 1862–68), supplemented by the *Lettres inédites,* prepared by Charles Capmas (2 vols., Paris 1876). The first volume of a new French edition, edited by Émile Gerard-Gailly, appeared at Paris in 1953. Standard French biographies are by Paul Mesnard (in the Monmerqué edition of the letters) and Baron Charles A. Walckenaer (5 vols., Paris 1842–52), and other editions). A modern English edition of the letters is by Alfred E. Newton (7 vols., Philadelphia 1928). Recent selections in English, with biographical commentary, have been prepared by Richard Aldington (2 vols., London 1937), Arthur S. Megaw (London 1946), and Violet Hammersley (New York 1956), the latter containing a preface by W. Somerset Maugham.

SEVILLE, sĕ-vĭl′ or sĕv′l (Span. Sevilla, sā-vēl′yä), southwest Spain: (1) inland seaport, capital of Seville Province, fourth city of Spain in population, situated on the east bank of the navigable Guadalquivir River, 50 miles from the Atlantic and 60 miles north-northeast of Cadiz. Seville is an important industrial and commercial city as well as seaport, but it is even more famous for its great historic and artistic monuments and traditions. The principal buildings of the city are grouped around or near the Plaza del Triunfo. The enormous Gothic cathedral (built 1402–1519) contains a profusion of works of art and historical treasures. There are paintings by Murillo, El Greco, and other famous artists. The cathedral is the second largest Christian church in the world, being surpassed only by St. Peter's in Rome. Architecturally notable are the adjacent Giralda (q.v.), or Bell Tower, and the delicate Moorish stone tracery which decorates the interior of the church. North of the cathedral is the Patio de los Naranjos, with the library of Columbus and a Moorish fountain. The Alcazar, however, is the chief specimen of Moorish architecture in Seville. It is considered second only to the Alhambra of Granada in beauty and historic interest. Construction of this fortified palace was begun in 1181. Conspicuous features are the ornate façade, the hall of the ambassadors, and the Patio de las Muñecas. In the rear are beautiful gardens. The Lonja, or exchange, is the repository of many important historical documents. The Ayuntamiento, or city hall, is a fine specimen of Renaissance architecture. It is situated between the Plaza de la Constitucion and the Plaza de San Fernando. Adjoining the city hall is the Audiencia, or court of justice. Other noteworthy buildings include the old tobacco factory, which inspired the first-act stage setting of Bizet's *Carmen;* the Casa de Pilatos, dating from the 15th century, with a fine colonnade and courtyard; and the Casa de las Dueños, with its numerous courtyards and nine fountains. There are many old and beautiful churches, including Omnium Sanctorum, San Marco, Santa Maria

la Blanca (an ancient synagogue), and La Caribad (the latter containing several *chef d'œuvres* by Murillo and J. de Valdes Leal. Many of the churches, in themselves uninteresting, contain masterpieces of sculpture and painting. The Museum contains works of art of inestimable value, representing the School of Seville (16th and 17th centuries). Other notable buildings include the University (1254) (1567), formerly a convent; the archbishop's palace; the royal cigar factory, "Fabrica de Tabacos," an enormous and palatial building, with many courts, fountains, and tropical plants; the palace of San Telmo and the picture gallery. The chief squares not mentioned are the Plaza Nueva, the Plaza del Duque, the large bull-ring, which ranks next to that at Madrid, and the Quemadero, the former scene of the *Autos-da-fé*. Las Delicias is a charming promenade along the river bank. The suburb of Triana is inhabited by gypsies and the poorer class. The Guadalquivir is a tidal river and navigable for large vessels into the city itself. Seville has always been an important commercial port. The exports include lead, quicksilver, iron ore, olives, oranges, cork and copper pyrites; the imports timber, drugs, chemicals, coal, coke, machinery, petroleum and coffee. The principal manufactures are tobacco, porcelain, hardware, soap, leather goods, chocolate, corks, etc. The Pickman tile factory at Cartuja is an old and noted porcelain manufactory. A railway connects the city with Cadiz and Cordova, and an iron bridge and two other bridges (one belonging to the railway) connect it with Triana (where typical peasant games and costumes are seen). Seville was first colonized by the Phœnicians, from whom it passed in turn to Romans, Vandals, Visigoths and Arabs and was finally taken by Ferdinand of Castile (1248), 300,000 Moors voluntarily seeking exile. It suffered many revolutions prior to this period, and later was depopulated by a yellow fever scourge. Under Soult (1810) the French robbed the city of her riches. The discovery of America gave the town considerable commercial importance as the seat of American trade. It is the birthplace of Velasquez Murillo and other celebrities. Pop. about 238,727. Consult Calvert, A. F., 'Seville' (London 1907); Gallichan, W. M., 'The Story of Seville' (London 1903).

(2) The province has an area of 5,428 square miles, and forms a part of Andalusia. The summits of the Sierra Morina rise at the north to a high elevation; south, the surface is low and fertile. The Guadalquivir is the principal river, and its affluents are the Genil, the Guadira, and the Guadalimar. The province is exceedingly fertile and produces all cereals and vegetables. The exports include tobacco, leather, paper, chocolate, silk and woolen goods, glass, soap and pottery. The chief European domestic animals are abundant, and in the higher districts occur copper, silver, lead, iron, coal, and salt mines, besides chalk and marble. Trade has developed rapidly by the building of railways in recent times. Four senators and twelve deputies represent the province in the Cortes. The chief towns are Seville (q.v.), Carmona, Constantina, Ecija, Lebrija, Marchena, Morón de la Frontera, Osuna and Utrera. Pop. about 849,841.

SEVRES, sāvr, France, in the departmenr of Seine-et-Oise, on the Seine, lies about 10 miles southwest of Paris, and an equal distance from Versailles. Its celebrated porcelain manufactory, founded at Vincennes in 1745 and removed to Sevres in 1756, was purchased by Louis XV, 1760. In 1876 the old and dilapidated buildings were replaced by a new structure, erected in the park of Saint Cloud. The Porcelain Museum contains numerous articles of china collected from all over the world, which represent every age and clime. A technical School of Mosaics was established here in 1875. Besides the celebrated Sèvres vases, painted glass and mosaics are made. In the artistic pottery the *pâte-sur-pâte* (or layers) method is used — original to this manufactory. The general effect is that of a cameo, though possessing greater delicacy and rich coloring. (See Ceramics; Porcelain). Sèvres has other manufactures of shawls, cordage, leather and chemicals. It was occupied by the German troops in 1870, bombarded by the French a few weeks later, and attacked by the troops of the Commune in 1871. Pop. about 8,500.

SÈVRES, Deux, a western department of France. In the northern, central and western portions the country is marshy. although it has been well drained in parts. In the southern part it is a limestone plateau. The chief rivers are the Sevre-Niortaise in the south, and the Sevre-Nantaise, which joins the Loire near Nantes. The northern part is known as the Gatine. The capital is Niort. In the south and southeastern parts of the department grain, beets and forage are grown, while hemp is produced in the west. There is some production of wine. On account of the extent of marshlands, wild fowl are abundant. Horses and mules are bred. The chief manufactures are cloth and woolens. The department has an area of 2,337 square miles, and a population of 308,841.

SEVRES PORCELAIN. See Porcelain.

SEVRES, Treaty of. See Turkey.

SEWAGE. See Sanitary Engineering; Wastes, City, Disposal of; Garbage.

SEWALL, Jonathan Mitchell, American poet: b. Salem, Mass., 1748; d. Portsmouth, N. H., 29 March 1808. He studied at Harvard, was for a time in trade, but took up the law, practised in Grafton County, N. H., and became register of probate there in 1774. His songs and verses appeared widely in American newspapers in the Revolutionary time, 'War and Washington' being among those familiar to the army. Probably a good share of his poetry was, like 'On Independence,' of the "pompous, rhetorical, and truly ligneous variety." But he wrote for a performance of Addison's 'Cato' at Portsmouth (1788), an epilogue, the concluding two lines of which are frequently quoted:

> "No pent-up Utica contracts your powers;
> But the whole boundless continent is yours!"

Sewall was a Federalist, and a "wit" of the time. A volume of his 'Poems' containing paraphrases of Ossian and of Washington's 'Farewell Address' appeared in 1801.

SEWALL, Mary Wright, American educacator: b. Milwaukee, Wis., 27 May 1844; d.

22 July 1920. Graduated from the Northwestern University, Watertown, Wis., in 1866, and was married to Theodore Lovett Sewall (d. 1895) in 1880. She became prominently connected with various woman suffrage associations, lectured extensively on woman suffrage, and served as delegate to numerous congresses in connection with that movement. She was identified as a manager of the Columbian Exposition at Chicago in 1893; was appointed by President McKinley commissioner to the Paris Exposition and its congresses in 1900; and was associated in 1915 with the Panama-Pacific Exposition. She was principal of the Girls' Classical School founded in Indianapolis by her husband until she retired into private life. She published various articles on literary and reform subjects, besides 'Historical Résumé of the World's Congress of Representative Women,' and 'Women, World War, and Permanent Peace' (1916).

SEWALL, Samuel, American jurist: b Bishopstoke, Hampshire, England, 28 March 1652; d. Boston, Mass., 1 Jan. 1730. He was graduated from Harvard in 1671, was ordained to the ministry, but was "diverted into a prosperous and benign secular career," started a printing-press at Boston, and entered public life as a member of the board of assistants. In 1692 he was made a member of the council and judge of the Probate Court, and in the latter capacity joined in the sentence of condemnation against witches at the time of the historic delusion. When he had realized his error he made in 1697 a public confession in church, and afterward spent therefor one day annually in fasting and prayer. He was appointed judge of the Supreme Court of Massachusetts, and from 1718 until his retirement in 1728 was its chief justice. He was possibly the first in America to attack negro slavery, publishing on the subject 'The Selling of Joseph' (1700), a three-page tract of much eloquence. But he is best known for his diary, a garrulous detail of every sort of minutiæ, comparable in this sort to Pepys or Evelyn, and extending from 1674 to 1729. It naturally affords a most valuable source for the political and social history of the colony. In fact, "we have (Chamberlain) no other book like it." Tyler calls Sewall "great by almost every measure of greatness." The diary was printed in volume V of the fifth series of the 'Collections' of the Massachusetts Historical Society.

SEWARD, sū'ard, **Anna,** English poet: b. Eyam, Derbyshire, 1747; d. Lichfield, 25 March 1809. She was a daughter of Thomas Seward, canon of Lichfield, and was known as "the swan of Lichfield." Some of her earlier poetical efforts were an 'Elegy on the Death of Mr. Garrick' and an 'Ode on Ignorance.' Her literary aspirations were fostered by her fellow-townsman, Dr. Erasmus Darwin, of whom she later wrote a 'Memoir' (1804). Her greater success was achieved with a 'Monody on the Death of the Unfortunate Major André' (1781), and an elegiac poem on 'Captain Cook' (1807). Horace Walpole declared she had "no imagination, no novelty," and Miss Mitford spoke of her as "all tinkling and tinsel — a sort of Dr. Darwin in petticoats." Her poems were published in 1810 with a memoir by Sir Walter Scott.

SEWARD, Clarence Armstrong, American lawyer and politician, nephew of W. H. Seward (q.v.): b. New York, 7 Oct. 1828; d. Geneva, N. Y., 24 July 1897. He was graduated at Hobart College in 1848, studied law and practised in New York after 1854. He was judge-advocate-general of New York State in 1856–60; and served as Acting Assistant Secretary of State of the United States after the attempted assassination of Secretary of State Seward in 1865. He was active in the creation of the State of West Virginia; and assisted Judge Blatchford in preparing 'New York Civil and Criminal Justice' (1850).

SEWARD, Frederick William, American lawyer, son of W. H. Seward (q.v.): b. Auburn, N. Y., 8 July 1830; d. 1915. He was graduated from Union College in 1849, admitted to the bar in 1851 and for 10 years was one of the editors and owners of the Albany *Evening Journal.* In 1861 he was sent to apprize Lincoln of the plot to assassinate him in Baltimore, served as Assistant Secretary of State in 1861–69 and in 1877–81, and narrowly escaped death in defending his father from an assault, 14 April 1865. He went with Admiral Porter on the special mission to negotiate the treaties with West Indies in 1867, assisted in the purchase of Alaska, and in the negotiations for Pago-Pago Harbor, Samoa. He was a member of the New York legislature in 1875, State commissioner at the Yorktown Centennial Celebration in 1881 and in 1900 became president of the Sagaponack Realty Company. He published 'Life and Letters of William H. Seward' (1891); 'A West Indian Cruise' (1894), and numerous articles in reviews and magazines.

SEWARD, George Frederick, American diplomat, nephew of W. H. Seward (q.v.): b. Florida, N. Y., 8 Nov. 1840; d. 1910. He was educated at Union College, and in 1861 was appointed United States consul to Shanghai, China, where he remained until 1876, serving as consul-general from 1863. In 1876–80 he was Minister to China, but was recalled in the last-named year in consequence of refusing to undertake the negotiation of a treaty to restrict Chinese immigration. During his residence in China he was active in suppressing riots and in reducing piracy. He was vice-president of the North China branch of the Royal Asiatic Society after 1887, and after 1893 was president of the New York Fidelity and Casualty Company. He published 'Chinese Immigration in Its Social and Economic Aspects' (1881); 'Digest of System of Taxation of New York' (1902), etc.

SEWARD, William Henry, American statesman: b. Florida, Orange County, N. Y., 16 May 1801; d. Auburn, Cayuga County, N. Y., 10 Oct. 1872. He was graduated from Union College (1820), and having studied for the law, began practising at Auburn in 1823, but soon indicated a decided bent for politics, which gradually drew him away from the legal profession. In 1830 he was elected as an anti-Masonic candidate to a seat in the New York senate, and from that date he was, with few intervals, in one form or another, an effective and prominent leader in the councils that framed the policy

both in his own state and of the nation. In 1838 he was elected first Whig governor of New York by a majority of 10,421. Though his administration was rendered peculiarly difficult by the internal dissensions of his party, it was marked by wise measures of reform, which definitely added to Whig strength in the state. During his term many of the disabilities of foreigners were removed, the antirent troubles were adjusted, the natural history and geological survey of the state was commenced, the state museum of natural history was established and a bill was passed securing for fugitive slaves a trial by jury with counsel furnished by the state. He was re-elected in 1840. From 1843 to 1849 he was occupied largely with professional practice, though he delivered several addresses on political and other topics.

He was elected in 1849 to the Senate, and there attained great influence as both a party leader and an adviser of President Taylor. In a speech of March 11, 1850 in favor of the admission of California, he spoke of the exclusion of slavery from all new states as demanded by "the higher law," a phrase which greatly offended Southern Democrats, and was made one of the battle cries of Abolition. Upon Fillmore's accession, Seward strongly opposed that president's proslavery attitude, though this was accepted by many Whigs in Congress. Having been re-elected senator in 1855, he took a leading part in the discussion, immediately antecedent to the rebellion.

In an address at Rochester, N. Y., in October 1858, he made reference to the "irrepressible conflict" whose outcome must make the United States a nation either all of free labor or all of slave. In 1856 and again in 1860 he was the most prominent Republican candidate for the presidential nomination, receiving on the first ballot at the Chicago convention in 1860, 173½ votes as against 102 for Lincoln, who was eventually chosen. Seward, however, spoke for Lincoln in the West and East, and was made secretary of state. This post he filled with notable efficiency, particularly in connection with the foreign relations of the government. He reorganized the diplomatic service, and by his able dispatches and the instructions furnished to representatives abroad retained the confidence of Europe, which had been ready to grant recognition and support to the Confederacy.

A famous incident of his secretaryship was the correspondence with Great Britain apropos of the "Trent affair." When the Confederate agents, Slidell and Mason, were removed from the British ship *Trent,* their restoration was peremptorily called for and war seemed certain. The answer, formulated by Seward and slightly amended by Lincoln, by its skill, closed the matter. Great Britain, it said, now recognized the principle of exemption from search, contended for in the War of 1812 by the United States, which now, therefore, willingly released the prisoners. Seward insisted on redress for American citizens for depredations by the *Alabama* (see ALABAMA CLAIMS). Secretary Seward firmly asserted the Monroe Doctrine in relation to the French invasion of Mexico, but, by avoiding a provocative attitude, which might have involved his government in a foreign war, was able to defer the decision to a more favorable time. Before the close of the Civil War he intimated to the French government the irritation felt in the United States in regard to its armed intervention in Mexico. Many dispatches on this subject were sent during 1865 and 1866, which gradually became more urgent, until the French forces were withdrawn and the Mexican Empire fell. Seward supported Lincoln's proclamation liberating the slaves in all localities in rebellion, and three years later announced by proclamation the abolition of slavery throughout the Union by constitutional amendment.

In the spring of 1865 Seward was thrown from his carriage, and his arm and jaw were fractured. While he was confined to his couch with these injuries President Lincoln was murdered, and on the same evening, April 14, one of the conspirators gained access to the chamber of the secretary, inflicted severe wounds with a knife in his face and neck, and struck down his son, Frederick W., who came to his rescue.

He negotiated treaties for the purchase of the Danish West India Islands and the Bay of Samoa, which failed of approval by the Senate, and made a treaty with Colombia to secure American control of the Isthmus of Panama, which had a similar fate. Seward sustained the reconstruction policy of President Johnson, and thereby alienated the more powerful section of the Republican Party and subjected himself to bitter censure and ungenerous imputations. He opposed the impeachment of the president in 1868, and supported General Grant for the presidency in the same year. Meanwhile, in 1867, he had negotiated the purchase of Alaska from Russia. After his retirement (March 1869), he visited "Seward's Folly," as his critics called Alaska, and in 1870 made a tour of the world.

Consult Bancroft, F., *Life of W. H. Seward,* 2 vols. (1899); Welles, Gideon, *Lincoln and Seward* (New York 1874); Seward, F. W. (ed.), *Autobiography of William H. Seward, from 1801 to 1834, with a Memoir of His Life,* and *Selections from His Letters, from 1831 to 1846* and *Seward at Washington,* 2 vols. (1891); Baker, G. E. (ed.), *The Works of William H. Seward,* 5 vols. (1884); Hale, E. H., *William H. Seward* (1910); Hendrick, B. J., *Lincoln's War Cabinet* (1946).

SEWARD, sū'ĕrd, city, Alaska, on Resurrection Bay. It is the southern and seaward terminus of the Alaska Railroad, and terminus of the Anchorage-Seward Highway. It is the chief community of the Kenai (keen eye) Peninsula which is noted for its big game hunting (moose, bear, and mountain sheep) and sport fishing. Industry centers around the railroad and waterfront. The city's deep-water harbor is visited by most steamers entering the territory. It has a territorial tubercular sanitarium, and a native school. Pop. (1950) 2,063; the district, 2,653.

SEWARD, city, Nebraska, and Seward County seat, altitude 1,442 feet, on the Big Blue River, 25 miles by highway northwest of Lincoln. It is served by the Burlington Route and North Western Lines and by federal and state highways. It is a trading center for the surrounding agricultural region. Located here is one of the large manufacturers of electric power line materials but most of its other industries are connected with agricultural pursuits.

It is the seat of Concordia Teachers College. The city was named for Lincoln's secretary of state and platted in 1868. It has a mayor and council government. Pop. (1950) 3,154.

SEWELL, Jonathan, Canadian jurist: b. Cambridge, Mass., 1766; d. 1839. He was edu-

cated at Bristol, England, and in 1785 he settled in Canada. He studied law, was called to the bar in 1789 and engaged in practice at Quebec. He was appointed solicitor general in 1793, and in 1795 became attorney general and judge of the Court of Vice-Admiralty. In 1808–1838 he was chief justice of Lower Canada. He made the decision concerning the disputed boundaries of Ontario, in 1818. He was president of the executive council in 1808–1829; and from 1809 he was speaker of the legislative council. He is said to have made the original proposal for the Canadian federation while in England in 1814. Author of *Plan for the General Federal Union of the British Provinces in North America* (1815); *Essay on the Judicial History of French Law so Far as it Relates to the Law of the Province of Lower Canada* (1824).

SEWELL, sū'ĕl, **Robert van Vorst,** American artist: b. New York, 1860; d. Florence, Italy, Nov. 18, 1924. He was graduated at Columbia University in 1883, and studied art under Georges Boulanger and Jules Lefebvre in Paris. He was awarded the Hallgarten Prize of the National Academy of Design in 1888. Among his works are the mural painting *The Canterbury Pilgrims* in the great hall at Georgian Court, Lakewood, N. J., and *The Story of Psyche,* a series of lunette decorations in the palmroom at the Saint Regis Hotel, New York.

SEWELL, William Joyce, American statesman: b. Castlebar, Ireland, Dec. 6, 1835; d. Camden, N. J., Dec. 27, 1901. He came to the United States in 1851, served as a sailor for a time and later engaged in business. He commanded a brigade at Chancellorsville, where he led a brilliant charge and was badly wounded. He was wounded also at Gettysburg, and served creditably on other battlefields. At the close of the war he was brevetted brigadier general and major general. He was interested in railroad affairs after the war; was elected to the New Jersey Senate in 1872, and was president of that body in 1876, 1879 and 1880. He was United States senator from New Jersey in 1881–1887 and 1895–1901. In 1899 he became major general of the New Jersey National Guard.

SEWELLEL, sē-wĕl'ĕl, a terrestrial rodent which is formed into a family by itself (Aplodontiidae), and regarded as a connecting link between beavers and squirrels. It is represented by a single species *Aplodontia rufus,* restricted to "a small area on the west coast of North America, in Washington, Oregon and California." The aborigines called it "Showt'l" or "Sewellel," the trappers the "Boomer" or "Mountain Beaver." The animal is plump, with broad head, short limbs and hardly any tail; measures about a foot in length; and has a brownish color. It lives socially in colonies, burrows underground and lives on vegetable matter. It dwells in wet places in which the vegetation is rank and dense. For its winter store it collects great quantities of woody plants and ferns, which it dries thoroughly in the sun before putting in storage for the winter. As a connecting link *Aplodon* is of much interest to naturalists, while the Indians use its skin and also its flesh.

SEWERAGE. See SANITARY ENGINEERING.

SEWICKLEY, borough, Pennsylvania, in Allegheny County, altitude 732 feet, on the Ohio River; by rail, 13 miles northwest of Pittsburgh, on the Pennsylvania Railroad. A residential suburb, it has no industries and restricts local trade to a minimum. Its name is an Indian word for "sweet water." Government is administered by burgess and council, with a borough manager. The water system is municipally owned. Pop. (1940) 5,614; (1950) 5,730.

SEWING MACHINES. The first existing description of a sewing machine is that of Thomas Saint, an English cabinet-maker. On July 17, 1790 he secured a patent on a machine to be used for "quilting, stitching, and sewing, making shoes and other articles." The specifications and drawings of the patent comprised, among other things, a crude device for forming a chain stitch. There is no evidence that Saint ever tried to introduce into practical use the mechanisms described in the patent.

In 1818, a sewing machine which made a backstitch was invented by the Rev. John Adams Dodge of Monkton, Vermont, but was neither patented nor manufactured.

The first sewing machine put into operation was patented in France, in 1830, by Barthélemy Thimonnier. By 1831 Thimonnier had 80 of these machines, which were made of wood, turning out clothing for the French Army. A mob of infuriated tailors, afraid of losing their livelihood because of this new invention, destroyed every one of the machines. Thimonnier kept working to improve his invention, and in 1850 he took out an American patent for a metal sewing machine. However, his efforts did not gain much recognition and he died in 1857 a poverty-stricken man.

Sometime between 1832 and 1834, Walter Hunt, one of the most prolific American inventors of his day, made a sewing machine which combined some of the essential parts of present-day models. His invention had a needle with an eye near the point, attached to the end of a vibrating arm. A loop was formed beneath the cloth by the needle thread, through which moved a shuttle reeling off another thread and making an interlocked stitch. Hunt did not patent his invention at this time and only built two machines. When, in 1853, he tried to secure a patent, he was unable to get one on the grounds that he previously had not applied for a patent and his invention, therefore, did not legally anticipate the patent granted to Elias Howe, Jr., in 1846.

Howe began his attempts to build a sewing machine in 1843. By 1845 he had built a machine which worked, and Howe gave public demonstrations to prove its superiority over hand sewing. But he was not able to get a single order for his machine. On Sept. 10, 1846, he received his first patent. Howe was the first person to patent a machine which combined the eyepointed needle with a shuttle for forming a stitch. His machine also had an intermittent feed for holding and carrying the material forward as each stitch was formed. The mechanical device for the feed was called the "baster-plate" and the length of the seam at one operation was determined by the length of the plate. Since Howe's machine at first met with no commercial success in the United States, he decided to try his luck in England. He was able to arrange an agreement with an English manufacturer, William Thomas, by the terms of which Howe was to receive a small

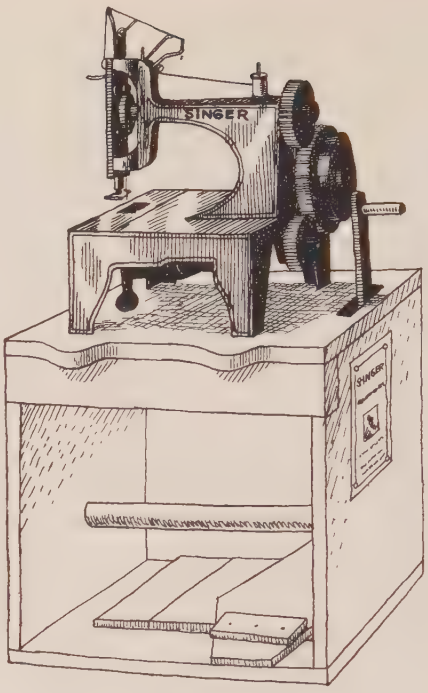
downpayment and a royalty on each machine sold in England. He was also to work for this manufacturer to adapt his machine to the making of corsets. Howe soon found it impossible to work for Thomas and he never received his royalties. In 1849 Howe came back to the United States to find that the sewing machine was arousing the public's interest and that several people were making machines which Howe believed infringed his patent. He thereupon launched a series of suits to protect his patent.

In 1847, Allen B. Wilson, then working as a cabinet-maker in Adrian, Michigan, conceived the idea of a sewing machine, although he had never heard of one. He did not complete full drawings of his machine until the latter part of 1848. On Feb. 3, 1849, he began the construction of his first model, which he completed in about 60 days. This machine made the lock stitch, the lower thread being carried by a double pointed shuttle. Wilson's machine contained the first automatic feed movement ever produced. This was called the "two-motion feed" which consisted of a horizontally reciprocating tooth surface (the pitch of the teeth being forward) engaging the material at all times, and while the needle was in the material moving back to take a new stroke. Wilson patented this machine on November 12, 1850. He next turned to a substitute for the shuttle, and he produced the rotary hook for forming the lock stitch between the upper and lower threads. This device, based on completely different mechanical principles than the shuttle, was patented on August 12, 1851.

It is a remarkable coincidence that on the same day a patent was granted to Isaac M. Singer for his first machine. The main features of the Singer machine were its straight needle, working at the extremity of a stationary overhanging arm, and its feed, consisting of a roughened wheel. A straight shaft in the overhanging arm imparted the motion to the needle, and the shuttle was driven in its race below the feed table by a mechanism deriving its motion from the shaft by means of tooth gearing. The feed consisted of an iron wheel with a corrugated surface, the top of which was slightly elevated above the level surface of the table. By an intermittent motion the feed carried the cloth forward between stitches without injury to the fabric. This device permitted the cloth to be turned in any direction by the operator while sewing, which was impossible with the styles of feed which perforated the goods. The material was held in place by a presser foot alongside the needle. This presser foot embraced an important feature possessed by no other sewing machine up to that time—the yielding spring which would permit the passage over seams, and adjust itself automatically to any thickness of cloth.

In the same year, 1851, William O. Grover and Baker patented a two-thread chain stitch machine. The stitch was made by a combination of circular reciprocating under-needle and a curved upper-needle with an eye near the point. This eliminated both shuttle and bobbin and made it possible for the upper and under threads to be taken from commercial spools.

On Dec. 19, 1854, a patent was issued to Wilson for his celebrated "four-motion feed." This is a device in which the flat-tooth surface of the feed, being in contact with the cloth, is moved forward, carrying the cloth with it; then drops out of contact with the cloth, is moved backward



The first Singer machine, patented 1851.

and then rises up against the cloth and is again ready for the first motion. This invention solved the problem of a practical feed, was soon generally adopted, and has become the feed motion of all makes of sewing machines.

In 1854, Elias Howe started to garner the fruits of his long legal battles. He won a verdict against the Singer Company, covering the use of the eyepointed needle. As a result of this victory and subsequent verdicts over the Wheeler & Wilson Company, and the firm of Grover and Baker, Howe was able to collect a royalty of $25 for every sewing machine that was manufactured. However, when Howe tried to improve his machine he was sued by the others for infringing their patents. To eliminate this perpetual legal warfare, the above-mentioned manufacturers decided to set up a patent pool covering all the main features of their sewing machines. An agreement was reached which provided that the pool was to license other manufacturers for a royalty of $15 per machine. Howe was to receive an equal share of the profits from this licensing system, and in addition he was to receive a royalty of $5 for every machine sold in the United States and $1 for every machine exported. Howe is estimated to have received close to $2,000,000 for this agreement. In 1860, the combination cut its license fee from $15 to $7, and Howe's royalty was reduced to $1 per machine. The patent pool broke up in 1877.

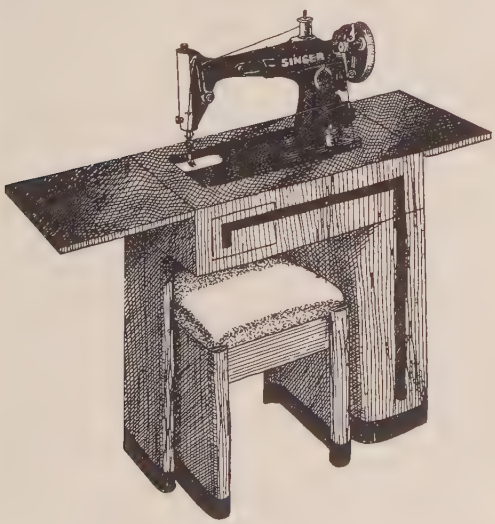
The next machine to be put on the market was the Willcox & Gibbs. This machine, which had a rotating hook for using a single thread to make the twisted loop-stitch, was first patented in June, 1857 by James Gibbs, a farmer of Millpoint, Va.

The first sewing machines were designed primarily for factory use, and it is in this field that these machines have made their greatest impact and have reached a very high level of technological development. After the Civil War,

there was a switch-over from hand to machine-sewn clothing. In 1866, an overcoat which formerly took 6 days to be sewn by hand could be sewn in 3 days by a machine. The first electrically-powered sewing machine was exhibited at the Paris Exposition in 1867, and by 1905 electric machines were an important factor in the manufacturing trades.

In the 1920's a machine was produced which was equally adaptable to sewing coat pads, embroidering, attaching lace, stitching window blinds, hat bands, and coat collars, tucking shirts and blouses, seaming shoe heels, binding woolen blankets, and ornamenting ladies' gloves. The latest industrial machines can work as fast as 5,000 stitches per minute. In 1948, the Singer Company produced an electronic machine which seams plastic film materials by means of high frequency current. There are over 4,000 types of industrial sewing machines. They are used in the manufacture of such products as life belts, parachutes, awnings, books, mens' and boys' clothing, corsets, curtains, rugs, gloves, hats, hosiery, luggage, pocketbooks, flags, sails, shirts, shoes, baseball gloves, tents, underwear and upholstery.

The introduction of electric power was a very important development in the field of home sewing machines. The first electric home machine was put on the market in 1889 but it was not until the 1920's that this machine came into widespread use. Since that time over 90 per cent of the machines sold in the United States have been electric-powered. Indicative of the improvements in home machines is the fact that whereas early machines approximated 200 stitches per minute, the latest models sew at the rate of 1,500 stitches per minute.



Typical modern sewing machine.

Almost all modern home sewing machines make the lock stitch. This stitch, which consists of an upper or needle thread and an under or bobbin thread locked together in the material, is made in the following manner: The eye-pointed needle goes through the material. As the needle starts to rise a loop of thread is formed. In the shuttle-type machine, the loop is immediately entered by a shuttle containing a bobbin of under thread. The shuttle thread is enclosed in the loop of needle thread and both threads are then drawn up by the action of the thread take-up lever and the stitch is tightened. In the rotary hook-type machine, the loop of thread is taken by the point of the hook and is passed around the bobbin case containing the bobbin of under thread, and is enclosed by the needle thread and both threads are then drawn up by the action of the thread take-up lever and the stitch is tightened.

In 1947 the Necchi machine, made in Italy, and in 1949 the Pfaff machine, made in Germany, came onto the American market. These machines embody an important development. Previously in order to do special work such as button-holing, darning, mending, embroidery, monogramming, etc., it was necessary to buy special attachments for home machines. However, with the Necchi and the Pfaff, by moving a lever or turning a dial, the needle is readjusted so that it can do the zig-zag sewing required for the special work.

SEX DEVIATIONS, sometimes called sexual aberrations, have concerned mankind almost from earliest recorded history. It is customary to refer to persons exhibiting what we are pleased to call sexual deviations, or departures from what modern society agrees to be normal, as sex perverts. Many persons, otherwise well informed, in their own minds have arranged these irregularities in various categories and speak of them casually as perverts, sexual psychopaths, sex neurotics, and so on, oftentimes without understanding very clearly the condition to which they refer. The object in this short article is to condense the subject, covering the main points in an effort to clear this misunderstanding.

Our social customs seem to compel society to look upon a sex deviate as one bringing disgrace to his family, and the admission to a gathering of normal people, of a homosexual, an outrage. This is because normal expression of sex feelings is supposed to be possible only between persons of the opposite sex. In other words, heterosexual relations, even if adulterous, are normal while homosexual ones are not. It should be understood clearly that homosexual persons are quite likely to be entirely normal mentally and are generally harmless. It is true that some deviations tend toward the criminal side and are coexistent with dementia precox, but the sex deviation is not dependent on the mental condition. Such major aberrations as sadism, rape, and indecent exposure are regarded as assaults upon society and offenders are liable to punishment. Sexual disorders are common, and by disorder is meant here a departure from the normal sexual goal for which men and women ordinarily strive. It is difficult to state exactly what the normal goal is, since sex relations can vary from excessive ecstasy to solemn frigidity and still be considered as within normal limits. It is only when normal impulse is denied that many persons seek satisfaction with one of the same sex. This denial may be social, or due to incarceration, or isolation, but is a manifestation of neurosis. Sex deviation is always a social phenomenon and divergence in one group or era is not always so elsewhere. There is hardly a type of sex custom that has not, in history, been forbidden at one time or another. It has been said that sex regulation is always conventional and never natural and certainly no law or

regulation was ever made to govern sex conduct that did not prove burdensome to great numbers of people. Nor have violations of such law and regulations failed to occur. To cite examples of the morality of yesterday which has become the immorality of today, marriage between brother and sister was common and even compulsory among the sovereign rulers of some ancient civilizations, who had never heard of incest. Even pederasty in many Eastern countries was considered a harmless amusement. Such abnormal conduct as flagellation, exhibitionism, the wearing of women's apparel by males, and like behaviorisms, while regarded with disfavor in Western civilizations, are looked upon elsewhere as not improper. Such examples have been mentioned to emphasize the fact that in the evolution of mankind, no single normal standard has ever existed that can be made to apply to civilization as a whole. It is impossible in studying sexual behavior to ignore the mammalian instinct. Thus "perversions" have even been observed in animals and there are such things as homosexual animals. This can be understood if we realize that sexual excitement seizes and accepts gratification wherever it can be found.

The historical background of various types of sex deviation furnishes much information on the subject. Among primary sex aberrations mentioned in ancient history are some well recognized entities. Lesbianism or the sexual love of one woman for another is now known as homosexuality in the female and also as Sapphism after the Greek poetess who lived in Lesbos. It is also called inversion. The term uranism is still used to denote a male with homosexual tendencies. It is a common belief that male homosexuals are lacking in virility and sexual development. What is lacking is frequently not development nor ability, but a desire for the opposite sex and this desire is developmental and not under control of the individual. Pederasty is the sexual love of men for boys. This was a widespread behaviorism in ancient Greece. Some of the greatest and strongest men in history have had at least homosexual tendencies, while many of the cruelest tyrants actively and openly exhibited their homosexualities. Among them were Tiberius and Nero. Sex deviations where animals have been involved have always been regarded with horror and have been punished as grave crimes even with death, as is prescribed in the Bible. In the Middle Ages the guilty person was burned alive. The use of the whip for punishment, either parental, religious, or judicial, has long been recognized. Flagellation, or the act of whipping, to produce gratification is as old as Roman history. Religious flagellation, not immoral in itself, was often used as a cloak to disguise the sadistic gratification of sexual deviants who lashed or were lashed for their own satisfaction. The development of sex impulses according to Sigmund Freud (1856–1939) begins in young children who, from birth, have a distinct sex life. Before the time of Freud it had been assumed that sex life began only at puberty. In the study of children we should probably substitute the term "desire" for the expression "sexual satisfaction," when discussing the sex life of the child. All children explore not only their sex organs but all portions of the body and take delight in experimenting with their body orifices, such as the ears, mouth, nose, vagina, and rectum. Touch, contacts, fondling, kisses, nursing, etc., all contribute to sexual excitement. A child has no sense of shame; even bed wetting and defecation are sources of interested satisfaction. Everything the child does is for his own pleasure and this self-love or narcissism, if uncontrolled, persists into adult life. Our habit demands a stronger suppression of sex impulse than of hunger. No one is ashamed of being hungry but not always is it possible to admit a craving for sex. As an individual grows older and curbs are placed upon him, sexual repressions accumulate and cause discomfort. These are often unrecognized for what they are and eventually the condition shows itself in a series of neurotic symptoms (sex neuroses). Much interest attaches to the cause of sex deviations especially homosexuality. This has been long debated and it has been classed as congenital and also as hereditary. It has been observed that most homosexuals regard themselves as normal and that only about one fifth make any fight against the craving. In the past, there have been some proponents of the theory of a "third sex" in which there is a tendency to bisexual development. Psychoanalysis at last revealed the true mechanism of the homosexual and has established as a fact that all homosexuals are probably heterosexual (having a normal craving for the opposite sex) early in life, but that homosexual tendencies and development in the male can be traced often to the strong mother attachment which persists in the adult. This is known as the Oedipus complex and is a frequent cause of sexual neurosis. A similar attachment between a girl and her father is known as the Electra complex. The application of the Oedipus complex is not simple and it can be understood thoroughly only by a study of case histories (see the bibliography). Homosexuality is somewhat more common in men than in women. The deviation including those with homosexual tendencies (inactive) form a considerable segment of the population, perhaps more than 5 per cent. While the ordinary uninformed individual conceives the abnormality as found principally in men of the "sissy" type the tendency is well concealed and in general is unsuspected. The homosexual, however, knows where his counterpart is to be found. Women especially may exhibit all degrees of homosexuality from an inactive and suppressed desire to fondle other women up to active participation where they seek out women and test their response to an approach. Many women limit participation to hugging and kissing while others are satisfied only by mutual sex gratification through physical contact within the privacy of the bedroom. It should be emphasized that many homosexuals of both sexes marry and have families and still remain deviates in their desire. Such unions are usually not particularly happy and are responsible for many divorces. Masochism is the counterpart of sadism and can be defined as sexual enjoyment attained from receiving bodily pain or humiliation from another. Fetishism is a form of sexual deviation in which the person's *libido* or sexual energy is attached to something that is a symbol of the love object. It is a symbolic obsessional form of sex gratification. The attachment may be to a woman's glove, shoe, handkerchief, undergarment, etc. Transvestism is a form of sex deviation in which a person attempts to play the role of one of the opposite sex by what is called

"crossed dressing." Such a condition has resulted sometimes from punishment inflicted on a young boy by forcing him to wear girl's clothing. Among miscellaneous deviations are cases of aberrations characterized by an intense desire to commit filthy and indecent acts. Some of these are the result of faulty and vicious upbringing in which the parents have been promiscuous and where this has been observed by the child. Poverty, abnormal life of the mother, such as prostitution, and many other early influences of an adverse character produce unfortunate results in the child. These unclean acts including coprophilia (obscene language) may verge on a psychosis. Children usually outgrow the practice of obscene writing on walls and toilets but this, including foul language used over the telephone, if present in adults, goes beyond mere sex irregularity and is harmful to society. Another form of deviation, also a psychosis, is the love manifested for a statue or model. Cases have been reported where a manikin was actually taken to bed, named, and endowed with personality by the person affected. This is known as Pygmalionism, from the Greek legend of a sculptor-king of Crete, Pygmalion, who fell in love with an ivory statue of a maid. Cannibalistic traits and vampirism are manifested by a desire to bite and tear human flesh or to drink human blood and have their origin in a desire for sex gratification. These are sometimes listed in police reports as mayhem. Even kleptomania (compulsory desire to steal) has its roots in sexuality, although it is actually a psychological disorder. Often the objects stolen have a symbolic value. Such shocking crimes as sex-murder, rape, and mutilation are sadistic acts once more common than is the case today and are atavisms seen occasionally in a civilized age. Deviations occurring in large groups of people are sometimes referred to as sex orgies. Most of those taking part are victims of sexual maladjustment and may be latent homosexuals. In many cases they are immature and exhibit adult infantilism. Exchange of wives on week-end frolics or where the husband derives pleasure from giving his wife to another are referred to as cases of pluralism. Hairclipping is a form of compulsive fetishism in the same class as exhibitionism and indecent exposure. While it may cause great alarm it is attended usually without other molestation. It should be noted that such compulsive acts including the serious acts of aggravated assault, mutilation, and even murder, are often committed in the face of the greatest risk of detection of the offender who will, in many cases, continue his course until apprehended.

Philandering, bigamy, and polygamy are common in our society and are known as behaviorisms or departures from a normal code of living. Those involved are nearly always sexually maladjusted.

To recapitulate, the sexual deviate gratifies in adult life the erotic desires of childhood and persists in living in his sexual past. Sex deviations are probably not actual disease entities but are symptoms of an underlying obsessional neurosis. Some are transitory and are amenable to proper treatment and some are not. Certainly not all sexual deviations can be classed as abnormal. Society should not adhere to the dogma that all sexual deviates should be shut up as a danger to society. For some thousands of years society has had to cope with the problem of sex abnormalities and it is incorrect to refer to homosexuality, for example, as a new and modern menace to our social order. It should be realized, to draw upon the language of some of those who are experts on the subject and have had unusual opportunity for observation, that perhaps some 90 per cent of persons have been guilty of "deviation," if we can always call it by that name and a large percentage of those have committed some act which, under a strict application of some law, could have brought him into a police court.

Any discussion of treatment in detail has no place in this article. It should not as a rule be attempted by one who has limited experience in handling cases which are best referred to a psychologist. Psychoanalysis and suggestion after a complete and exhaustive overhaul of the mental attitude of the patient, with prolonged and regular care, offers the best hope of success.

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Harold Wellington Jones, M.D.,
Editor-in-Chief, "Blakiston's New Gould Medical Dictionary."

SEXAGESIMA, sĕks-ă-jĕs'ĭ-mă, **SUNDAY,** the second Sunday before Lent. See Quinquagesima.

SEXTANT, sĕks'tănt, a portable instrument for measuring the altitudes of the heavenly bodies above the horizon, or their angular distance as seen in the sky. It was invented independently by Thomas Godfrey, of Philadelphia, and Captain Hadley of the British Navy, about 1730. The principles on which it works will be seen by a study of Fig. 1. C is a plain flat mirror, of which the polished side is turned downward and toward

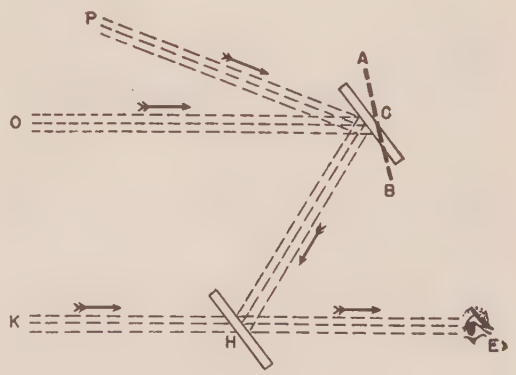


Fig. 1.

the left. H is a flat plate of polished glass through which an eye placed at E may view a distant object in the direction K by light coming through it in the direction of the dotted lines. Light emanating from another object O or P and falling on the mirror C will, where the mirror is properly directed, be reflected along the line CH and, in striking the glass plate H, a certain portion of it will be reflected in the direction HE, so that the observer with his eye at E will see both the objects K and O or P in coincidence. If the mirror C is set parallel to H as in the figure, the rays KE and OC will be parallel, and may, therefore, be considered as emanating from the same object at an infinite distance.

Thus the eye will see two images in the mirror as if together. But if the mirror C be moved into a different direction, that shown by the dotted line AB for example, the direction of the ray, the direction of the line PC, the rays along which are reflected to H, will deviate from OC by double the angle through which the mirror has turned. This doubling is caused by the fact that the angles of incidence and reflection are both changed by the motion of C. It follows that if the observer can measure the angle between the mirror C and H, doubling this angle will give him the difference of direction between the rays coming from K and from P .

The sextant is used to measure this angle. The essential parts of it are shown in Fig. 2. The part ABC consists of the arc AB round C as a center and firmly fastened by the radii CB and CA which are again firmly connected by a framework not shown in the figure. To this framework is attached the fixed plate of glass H, of which the lower half is silver while the upper half is transparent. T is a telescope, also firmly fixed to the frame, through which the eye looking in at E may see a distant object

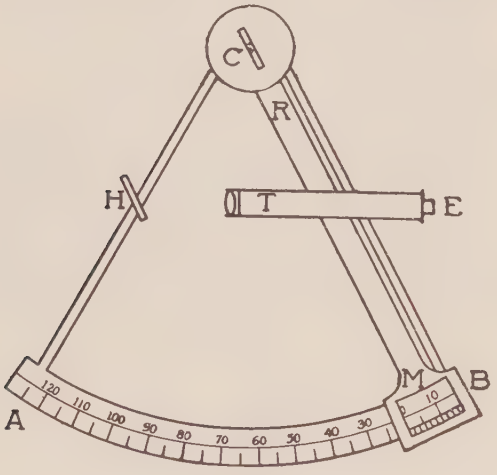


Fig. 2.

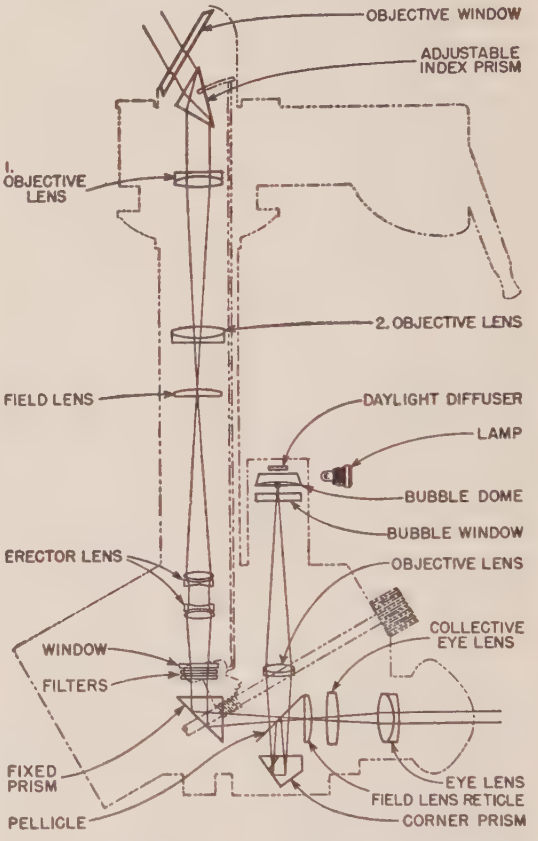
through the transparent portion of the mirror, and at the same time see any other object by the light reflected from the silvered part. The arc AB is graduated to degrees and fractions as shown by the figures. Owing to the doubling of the angle, the measures on the arc BA are also double. That is to say, this arc is only 60 degrees in length, but is divided into 120 degrees, so as to show the actual altitude of the object observed.

RM is a movable arm carrying a mirror C called the index glass, fixed to it perpendicularly at its upper end. The arm revolves around C as a center. At its lower end there is an index mark and vernier by which the position of the arm with respect to the graduations on the arc may be determined.

The altitude of a heavenly body at C is then measured by the observer taking the instrument in his hand and holding it in a vertical position, with the telescope ET horizontal, so that the sea horizon may be seen through the transparent part of the horizon glass H. The observer facing in the vertical plane of the sun or other object then turns the arm RM around the center C until he brings the sun into sight, through its rays being reflected first from C and then from H. When the limb of the sun is thus made to coincide with the horizon, the angle through which the arm RM has moved from parallelism is shown by the position of the index on the graduated arc BA, which is then determined by the vernier.

In ordinary use the navigator never has to measure angles exceeding 90°. In this case the arc BA need only to be 45 degrees in actual length. The instrument is then called an octant. This was the original form used by Hadley.

"For very accurate use the arc is extended down so as to form a complete circle. A special device is employed to bring about the proper reflection of the light; but the reflecting circle, as the instrument is called, is too complicated to admit of common use by the navigator."



Bubble sextant.

Bubble Sextant.—Aircraft sextants, designed to perform the same function as marine sextants, actually differ from the latter in many significant ways because of the conditions of their employment. The natural horizon is very seldom visible for use as the celestial navigation reference in aircraft. A gravity-responsive element, such as a circular bubble is, therefore, incorporated into the optical system to serve as an "artificial horizon." Such a gravity-responsive device, however, also responds to any other acceleration, and, because accelerations constantly accompany even the straight and level flight of aircraft, a single observation made against such a reference could be in error by 150 miles owing to its momentary deviation from the true vertical. Therefore, the average of several observations is performed by mechanical means over a period of one or two

minutes, and, under normal flying conditions, achieves an accuracy within five to eight miles.

The latest standard sextant is periscopic, a form demanded by the speed and altitude of modern aircraft which deprive the crew of observation windows or domes. The periscopic sextant permits observations from +10° to +92° altitude through 360° in azimuth through a 1⅜ inch diameter tube, extending 1½ inches above the skin.

An outline of the sextant is reproduced below with its more important optical elements labeled. The index prism performs the same function as the mirror, C, of the marine sextant, being rotatable, its angle indicating the altitude of the celestial body. A knob in the body of the sextant controls the prism rotation via a worm, sector gear, and rod linkage (indicated by dotted line) and is coupled to a counter (not shown) which gives the altitude of the object directly in degrees and minutes. The path of light from the object is traced through the objective and erecting systems, the fixed prism which directs the light to the horizontal eyepiece and the focusable eyepiece. The bubble is in a transparent chamber mounted next to the objective tube and is illuminated by daylight or a lamp. Its image passes through a lens to a corner reflector prism and back to a beam splitter, whence a portion of the light is reflected into the eyepiece. An observation is obtained by rotating the prism until the image of the object lies inside the center of the bubble image.

The sextant is maintained in a gimballed mount attached to the aircraft, containing a shutter which is closed when the sextant is not installed. This mount offers the periscopic sextant a unique advantage over any hand-held sextant, in that is is capable of positive azimuthal positioning. With a rotatable compass rose in the mount, the sextant can be used to measure relative bearings and can thus check the aircraft magnetic compass by obtaining true heading. In this employment it replaces another aircraft instrument normally required, the astrocompass.

SEXTET (from Lat. *sextus*, sixth), *in music*, is a composition for six voices or instruments, or for voices with instrumental accompaniment. Instrumental sextets are generally compositions in sonata form.

SEXTON, Frederick Henry, Canadian engineer and educator: b. New Boston, New Hampshire, June 9, 1879. He was educated at the Massachusetts Institute of Technology, and was professor of metallurgy there, 1901–1902. He was research metallurgist, General Electric Company, Schenectady, N. Y., 1902–1904; assistant professor of mining and metallurgy at Dalhousie University, Halifax, Nova Scotia, 1904–1906; and president of the Nova Scotia Technical College from 1906 to 1947. He was also regional director for Nova Scotia, of Canadian Vocational Training, 1940–1947. He is author of many technical papers.

SEXTON, a church officer whose duties consist in taking care of the church generally, to which used to be added the duty of digging and filling up graves in the churchyard, when the church had a cemetery attached to it. In the United States the sexton is also very often an undertaker, and thus continues in a form different from the old-time sexton, to attend to the interment of church members. The term sacristan, of which sexton is a corruption, applies more particularly to an official in the Roman Catholic and Anglican churches, who has charge of the sacristy and its contents, and of the vestments worn during the service. He occupies a considerably higher rank than the ordinary sexton, and in English cathedrals is often a minor canon.

SEXTUS EMPIRICUS, sĕks'tŭs ĕm-pĭr'ĭ-kŭs, Greek physician and skeptic, who flourished in the first half of the 3d century. He lived at Alexandria and Rome. Skepticism appears in his writings in the most perfect state which it reached in ancient times. We have two works by him, written in the Greek language, and they are the source of our knowledge of the Greek skeptical philosophy. One of them entitled *Outlines of Pyrrhonism* in three books, explains the method of Pyrrho; the other, entitled *Against the Mathematicians,* is an attempt to apply that method to all the prevailing philosophical systems and other branches of knowledge.

SEXUAL SELECTION, a term used by Darwin to denote a special phase of natural selection, depending on a competition between rival males, in which a premium is set on those qualities which favor their possessors in securing mates. This competition takes two forms: On the one hand, rival mates, for instance, stags or gamecocks, fight with one another and the conquerors have naturally the preference in mating; on the other hand, rival males sometimes seem to vie with one another in displaying their attractive qualities before their desired mates, who, according to Darwin, choose those that please them best. Darwin gives the following summary of his theory:

"It has been shown that the largest number of vigorous offsprings will be reared from the pairing of the strongest and best-formed males, victorious in contests over other males, with the most vigorous and best-nourished females, which are the first to breed in the spring. If such females select the more attractive and, at the same time, vigorous males, they will rear a larger number of offspring than the retarded females, which must pair with the less vigorous and less attractive males. So it will be if the more vigorous males select the more attractive and, at the same time, healthy and vigorous females; and this will especially hold good if the male defends the female, and aids in providing food for the young. The advantage thus gained by the more vigorous pairs in rearing a larger number of offspring has apparently sufficed to render sexual selection efficient."

In regard to the second aspect of sexual selection, in which the females are believed to exercise some choice, giving the preference to those suitors which have brighter colors, more graceful forms, sweeter voices or greater charms of some kind, there is no little difference of opinion. Darwin indeed believed strongly in the female's choice and referred to this process of selection many of the qualities which distinguish male animals. The females "have by a long selection of the more attractive males added to their beauty or other attractive qualities." On the other hand, Alfred Russel Wallace maintains a very different position. "There is," he says, "a total absence of any evidence that the females admire or even notice the display of the males. Among butterflies there is literally not one particle of evidence that the female is influenced by color or even that she has any power of choice, while there is much direct evidence to the contrary." Against this, G. W. and E. G. Peckham, in their careful essay on sexual selection in

spiders state that they have in the *Attidae* "conclusive evidence that the females pay close attention to the love dances of the males and also that they have not only the power, but the will, to exercise a choice among the suitors for their favor." Some observers of birds are also confident that the females choose the more musical or otherwise attractive males. But again Wallace maintains that the fact that every male bird finds a mate "would almost or quite neutralize any effect of sexual selection of color or ornament; since the less highly colored birds would be at no disadvantage as regards leaving healthy offsprings."

The theory of sexual selection is of considerable importance in a general theory of evolution. This may be illustrated in reference to the bright plumage of many birds. If we postulate successive crops of variations (which cannot at present be completely rationalized), if we acknowledge that there is really "preferential mating" among birds (which is not readily proved or disproved), if we believe that the females are sensitive to the slight excellences which distinguish one suitor from another and that their choice of mates is determined by these excellences (which A. R. Wallace emphatically denies), then we may say that the greater brightness of male birds may have been evolved by sexual selection. This was Darwin's opinion. The brighter males succeeded better than their rivals in the art of courtship; the variations which gave them success were transmitted to the offspring; gradually the qualities were established and enhanced as secondary sexual characters of the species. But Wallace interpreted the facts quite otherwise. The relatively plain plumage of the female birds was due to natural selection, eliminating those whose conspicuousness during incubation was fatal, fostering those whose coloring was protective. Just as Daines Barrington, a naturalist, still remembered as the correspondent of Gilbert White, suggested (1773) that singing birds were small and hen birds mute for safety's sake, so Wallace maintained that female birds had forfeited brightness as a ransom for life.

The doubts and difficulties arouse skepticism as to the thoroughness of the explanations of secondary sexual characters suggested either by Darwin or by Wallace. It is not surprising therefore, to find St. George Mivart's explanation of the beauty of males as the direct expression of an internal force, or Paolo Mantegazza's hints as to physiological explanation of the sexual divergence, or W. K. Brook's reference to "something within the animal which determines that the male should lead and the female follow in the evolution of new breeds." P. Geddes advanced further, endeavoring to interpret the secondary sexual characters as outcrops of the relative preponderance of anabolism and katabolism characteristic of females and males respectively. Gay coloring—sometimes at least due to pigmented waste products—is regarded as a characteristic expression of the predominantly katabolic or male sex and quiet plainness is equally natural to the more anabolic females. But this theory, which seeks to rationalize the variations which Darwin simply postulated, is by no means inconsistent with a recognition of sexual selection as an accelerant directive process in the evolution of male brightness, or of natural selection as a retardative directive process eliminating disadvantageously conspicuous females.

Wallace in his later works advanced toward a rational interpretation of the variations which he was previously content to postulate as facts. For he says that "ornament is the natural outcome and direct product of superabundant laws of growth and development." It seems to some that this mode of interpreting characters is of far-reaching importance and that it affects not only the theory of sexual selection but that of natural selection as well.

To sum up, the problems involved in sexual selection are (1) what physiological conditions explain the secondary sexual characters which so often distinguish males and females; (2) to what extent has sexual selection guided the differentiation of the sexes alike in distinctive qualities and in aesthetic sensitiveness? Before these problems can be adequately solved many more facts must be accumulated.

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SEYCHELLES, sā-shĕl′; -shĕlz′, islands, Indian Ocean, belonging to Great Britain. This 92-island group (area 156¼ square miles), is about 1,000 miles east of Mombasa, Kenya Colony. Victoria, the capital and chief port, is on Mahé, the largest island of the group (56 square miles). The principal crops are coconut, cinnamon, patchouli, and vanilla. Guano deposits are worked, and turtles, and the yolks of birds' eggs are collected. In 1951, the Colonial Development Corporation, a British government enterprise, were financing a fisheries project. Fish obtained on the banks between Seychelles and Mauritius, were dried and salted on St. Anne Island and then exported to East Africa.

There were 34 elementary and primary schools in 1950 (government 27; private 7); three government secondary schools, and one vocational school. Highways on Mahé in 1950 totaled 118 miles about 88 miles of which could be used by automobiles. Steamships between Bombay, India, and Durban, Union of South Africa, called monthly at Victoria.

History and Government.—The Seychelles were discovered by the Portuguese and first colonized by the French (1743). The islands were occupied in 1810 by the British to whom they were ceded by the Treaty of Paris in 1814. The government is administered by a governor, assisted by a six-member executive council. The population in 1950 was estimated at 35,703 which comprised descendants of early French settlers, Africans (mainly descended from liberated slaves), a Creole class, and a few whites.

SEYFFARTH, zī-färt′, Gustave, American educator and Egyptologist: b. Uebigau, Saxony, July 13, 1796; d. New York, Nov. 17, 1885. He was professor of archaeology and exegesis at the

Concordia Lutheran Theological Seminary, St. Louis, 1855–1871. He then retired and lived in New York. He was a lifelong student of Egyptology and made many translations. He was the author of *Theologische Schriften der Alten Aegypter* (1855); *Summary of Recent Discoveries in Bible Chronology* (1857); *Chronologia Veterum* (1871).

SEYMOUR, sē'mōr, a noble English family of Norman origin. Their name is corrupted from St. Maur, their seat in Normandy. They acquired lands in Monmouthshire in the beginning of the 13th century and early in the 15th century added to these estates others in Somersetshire.

The first member to become conspicuous was SIR JOHN SEYMOUR, the father of the third wife of Henry VIII and of Edward Seymour, protector of the realm of England during the minority of Edward VI, whose uncle he was. He commanded in a maritime expedition against the Scots in 1544, when he landed a body of troops at Leith and set fire to the city of Edinburgh. By the will of Henry he was nominated one of the council of regency during the minority of Edward VI; but, not content with his share of power, he procured for himself appointment as governor of the king and protector of the kingdom (January 1547). In the month following he obtained the post of lord treasurer, was created first duke of Somerset and made earl marshal. The same year he headed an army, with which he invaded Scotland, and after having gained the victory of Musselburgh returned in triumph to England.

His success excited the jealousy of the earl of Warwick and others, who procured his confinement in the Tower. Six months after he obtained a full pardon from the king and was ostensibly reconciled to his adversary, Lord Warwick. The reconciliation was probably insincere, as Warwick caused Somerset to be again arrested, in October 1551, on the charge of treasonable designs. He was tried, found guilty, attainted and beheaded on Tower Hill in January 1552. His eldest son by his second wife was created earl of Hertford by Elizabeth. The earl of Hertford under Charles II having distinguished himself in support of the royal cause during the Parliamentary war obtained in his favor the revival of the title of duke of Somerset and took his seat in the House of Lords as second duke in 1660.

SEYMOUR, Charles, American educator and historian: b. New Haven, Conn., Jan. 1, 1885. He was educated at Cambridge and Yale universities, graduating from the latter in 1908. From 1911–1915 he was instructor in history at Yale, from 1918 professor, from 1927 provost, from 1937–1950 president of Yale University. He was chief of the Austro-Hungarian division of the American Commission at the Paris Peace Conference in 1919, and was also on the commissions for other countries.

He has written *Electoral Reform in England and Wales* (1915); *The Diplomatic Background of the War* (1916); *Woodrow Wilson and The World War* (1912); *American Diplomacy During the World War* (1934); *American Neutrality 1914–1917* (1935). He was editor of *What Really Happened in Paris* (1921) and *The Intimate Papers of E. M. House* (1926–28).

SEYMOUR, Horatio, American statesman: b. Pompey Hill, Onondaga County, N. Y., May 31, 1810; d. Utica, N. Y., Feb. 12, 1886. He was educated at Geneva Academy (now Hobart College) and at a military school at Middletown, Conn.; studied law at Utica and was admitted to the bar in 1832. In 1833 he became military secretary to Governor Marcy and held the position six years. He was elected to the State assembly by the Democrats of Oneida County in 1841; was mayor of Utica in 1842; re-entered the assembly in 1843 where, as chairman of the committee on canals, he outlined the policy subsequently followed by the State. He was chosen speaker in 1845 and nominated for governor in 1850, was defeated by Washington Hunt, but in 1852 was elected by a large majority. During his term a prohibition law was passed by the legislature and was vetoed by him as unconstitutional. The strong temperance sentiment prevalent at the time made his act very unpopular. During the term of his successor the vetoed law was again passed by the legislature, but was declared unconstitutional by the Court of Appeals. He was again elected governor in 1862 and made an unequivocal declaration in favor of the supremacy of the Constitution and the restoration of the Union, though he denied that the war was the unavoidable result of slavery, or that slavery should be abolished in order to restore the Union. In July 1863 serious riots broke out in New York, involving loss of life and destruction of property. These were caused by the draft-law which discriminated against New York City in the allotment of quotas. The governor's complaint to the President secured an investigation which resulted in procuring a correction of the errors of the enrolment. In 1868 he was nominated for the presidency, but was defeated by Ulysses S. Grant, receiving 80 electoral votes to the 214 cast for Grant.

SEYMOUR, Jane, queen of England: b. England, 1509?; d. Hampton, Oct. 24, 1537. She was the eldest child of Sir John Seymour and sister of Edward, Duke of Somerset and Protector of England. She became the third wife of Henry VIII (q.v.) and the mother of Edward VI (q.v.). She was the first maid of honor to Anne Boleyn, whom she supplanted in 1536, and favored the Protestant Reformation.

SEYMOUR, Thomas Day, American classical scholar: b. Hudson, Ohio, April 1, 1848; d. Dec. 31, 1907. He was graduated at the Western Reserve College in 1870 and later studied at the Universities of Leipzig and Berlin. He was professor of Greek at Western Reserve College in 1872–1880; and chairman of the managing committee of the American School of Classical Studies, Athens, Greece, in 1887–1901. He edited the *College Series* of Greek authors and was American coeditor of *Classical Reviews*. Author of *Selected Odes of Pindar* (1882); *Introduction to the Language and Verse of Homer* (1885); *Introduction and Vocabulary to School Odyssey, Eight Books* (1897); *School Iliad, Six Books* (1889–1901).

SEYMOUR, Thomas Hart, American legislator and diplomat: b. Hartford, Conn., 1808; d. there, Sept. 3, 1868. He was educated at a military academy at Middletown, Conn., became a lawyer at Hartford, and was editor of *The*

Jeffersonian Democrat in 1837. He was a member of Congress in 1843–1845, served through the Mexican War, rising to the rank of colonel, and in 1850–1853 was governor of Connecticut. He was presidential elector in 1852; was United States minister to Russia in 1853–1857, and during the Civil War acted as leader of the Connecticut Peace Democrats, in which connection he lost much of his popularity. In 1862 the state senate voted that his portrait, with that of Isaac Toucey, should be removed from the chamber till the comptroller should be satisfied of his loyalty. In 1863 he was again a candidate for governor but was defeated by W. A. Buckingham.

SEYMOUR, Truman, American soldier: b. Burlington, Vt., Sept. 25, 1824; d. Florence, Italy, Oct. 30, 1891. He was graduated from West Point in 1846, fought in the Mexican War, and was brevetted captain. In 1850–1853 he was assistant instructor at West Point, served in the Seminole War of 1856–1858, and under Major Anderson at the defense of Fort Sumter in 1861, receiving the brevet of major in recognition of his services. He became chief of artillery in McCall's division of the Army of the Potomac in 1862, and was commissioned brigadier general of volunteers. He was engaged in the Virginia and Maryland campaigns, was in command of a division at Malvern Hill, Manassas, South Mountain and Antietam, receiving rank of brevet colonel. As chief of staff to the commanding general of the Department of the South in 1863 he led a division on Folly Island, took part in the attack on Morris Island and commanded the unsuccessful assault of Fort Wagner on July 18, in which he was severely wounded. He commanded a brigade in the battle of the Wilderness, was taken prisoner, and after his exchange in the following August was in command of a division in the Shenandoah Valley, and was engaged in the operations around Petersburg until the close of the war. He was present at Lee's surrender. He was brevetted major general of volunteers and brigadier general in the regular army, and in 1865 was mustered out of the volunteer service. He became major of artillery in 1866 and served in command of various forts until his retirement in 1876. After his retirement he resided in Europe.

SEYMOUR, town, Connecticut, in New Haven County, altitude 160 feet; on Naugatuck River; on the New York, New Haven and Hartford Railroad; by rail, 12 miles south of Waterbury. In 1802 Col. David Humphreys (q.v.), who was the first to import merino sheep into the United States, started at Seymour the first woolen mill of major size. This early industrialist was also a philanthropist, endeavoring to improve the lot of the workers. The impetus he imparted to the town's development has persisted, and it is today a busy manufacturing center, making woolen goods, paper, wire cables, textiles, tools, hardware, and articles of rubber and of brass. Previously known as Humphreyville, upon incorporation ás a town in 1850, the place assumed its present name, in honor of Thomas H. Seymour (q.v.), who at that time was governor of the state.

The government of the town is administered by a board of selectmen. Pop. (1940) 6,754; (1950) 7,832.

SEYMOUR, city, Indiana, in Jackson County, altitude 607 feet; on the Pennsylvania; the Baltimore and Ohio; and the Chicago, Milwaukee, St. Paul and Pacific railroads; by rail, 62 miles southeast of Indianapolis. The city has a 2,300-acre municipal airport with charter service. Located in a region of farming and stock raising, Seymour is a trade center and has considerable manufacturing interests. Among its industrial products are blankets, shoes and shirts, automotive parts, plastics, farm tools, kitchen cabinets, and veneer. There are food-packing and canning plants, and a farmers' co-operative grain elevator. Educational, cultural, and welfare facilities include public and parochial schools, a business college, a Carnegie library, an art museum, and a memorial hospital. The churches represent the usual variety of denominations. Seymour was founded in 1852, and incorporated as a city in 1867. It was named for a construction engineer of the Ohio and Mississippi Railway, through connection with which, in 1857, the Baltimore and Ohio extended its service westward to St. Louis. The city has mayor and council. Pop. (1940) 8,620; (1950) 9,629.

SFAX, sfäks, city, Tunisia, capital of Sfax district, on the north shore of the Gulf of Gabès, 150 miles south-southeast of Tunis, opposite the Kerkennah Islands. It is strongly fortified and surrounded by gardens and villas. The European, Arab and French portions are the three distinct divisions of the town. The first modern; the second—in the central portion—walled and entered by two gates; the third, a camp. Sfax is an important seaport, with a considerable trade in dates, olive oil, wool, fruits, sponges, and grasses, cotton, woolen and silk goods, superphosphates, soap, perfume and carpets are manufactured. A safe harbor and a railway connecting with the interior are modern features. The harbor is provided with a repair dock and slips for fitting and repairing the sponge and fishing vessels. Sfax was occupied in the 12th century by the Sicilians, and in the 16th century, for a brief period, by the Spaniards. One of the principal events of the conquest of Tunis by the French was the bombardment of the town in 1881. Pop. (1946) 54,637.

SFORZA, sfôr'tsä, a celebrated Italian house, which played an important part in the 15th and 16th centuries, gave six sovereigns to Milan and formed alliances with most of the princely houses of Europe.

The founder of the house was a peasant of Cotignola in Romagna, Giacomuzzo (Muzio) Attendolo: b. Cotignola, in the Romagna, June 10, 1369; d. Jan. 4, 1424, whose skill and courage made him one of the most powerful condottieri of Italy. His surname of Sforza (the forcer), which vouches for his great strength, he is said to have received from Alberigo Barbiano, the true founder of the condottiere mode of warfare in Italy. He served in the wars in the papal states, in Tuscany and in Naples, and died as grand constable of Naples.

His son, Francesco: b. July 25, 1401; d. Milan, March 8, 1466, received the command of the Milanese forces in the war against Venice. In 1447 he laid claim to the states of Milan in virtue of his wife, although she was only the natural daughter of the last duke, and to enforce his claim concluded a treaty with Venice,

and advanced against Milan. He laid siege to the city in 1449, and on March 3, 1450, it was forced by famine to surrender. His son GALEAZZO MARIA: b. Jan. 24, 1444; d. Dec. 26, 1476, a barbarian and a voluptuary, was murdered by conspirators. The son of Galeazzo, GIOVANNI GALEAZZO: b. 1468; d. 1494, never actually ruled. Till 1480 he was subject to the guardianship of his mother and her minister, Checco Simonetta. The latter was then beheaded by his uncle Lodovico, surnamed the Moor, in 1481. Lodovico then assumed the government himself and kept his nephew virtually a prisoner in the castle of Pavia. At a subsequent period he joined the league against France, and was on that account deposed by Louis XII (1500). He was taken to France where he died. His son MASSIMILIANO: b. 1491; d. 1530, once more drove the French from his territories by the aid of the Swiss, but in consequence of the battle of Marignano was obliged to cede his dominions to Francis I (1515) in consideration of a pension. The remainder of his life was spent in France. Francis was afterward driven from Italy by the Emperor Charles V, who invested FRANCESCO: b. 1492; d. Oct. 24, 1535, brother of Maximilian, with the duchy of Milan in 1522. On the death of Francesco in 1535 Charles V conferred the duchy on his son Philip II, king of Spain.

Consult Ady, C. M., *History of Milan under the Sforza* (New York 1907).

SFORZA, COUNT **Carlo**, Italian statesman: b. Lunigiana, Sept. 25, 1872; d. Rome, Sept. 4, 1952. He was a descendant of the Renaissance Sforza family and leading Italian opponent of fascism from its inception to its overthrow.

Appointed minister to China in 1911, Sforza was recalled in 1915, during the First World War, to assume diplomatic control of Corfu and Albania. After Turkey's surrender in 1918 he represented his country as one of the three Allied high commissioners at Constantinople, returning to Rome in June 1919 as undersecretary of state for foreign affairs in F. S. Nitti's Cabinet. At this time he also became a member of the Senate. A year later he was appointed minister for foreign affairs in the G. Giolitti Cabinet. At the Inter-Allied Conference at Boulogne in June 1920, he stoutly opposed Lloyd George's support of Greek ambitions for the dismemberment of Turkey, as proposed by E. Venizelos (q.v.) at prior conferences. He also opposed the secret accord made by his predecessor Tommaso Tittoni with Venizelos and the English, providing for the division of Albania between Greece and Italy with an Italian mandate over that country and transfer of the Dodecanese Islands from Italy to Greece.

On Nov. 12, 1920, at Rapallo, he successfully negotiated a treaty with Yugoslavia. He also signed anti-Habsburg agreements with Yugoslavia, Czechoslovakia and Rumania, and proposed the frontier partition of Upper Silesia finally adopted by the League of Nations.

In November 1922 he resigned as ambassador to France in protest at Mussolini's assumption of the premiership. Thenceforward, he was one of Mussolini's bitterest critics, refusing many overtures of the Duce to join his party.

After the assassination in June 1924 of Giacomo Matteoti, Mussolini's chief critic in the chamber, Sforza was one of three senators who denounced the government as responsible for the crime.

The suppression of all opposition parties in 1926 forced Sforza into exile. As ardent protagonist for a democratic Italy and lecturer in foreign universities, including many in the United States which conferred honorary degrees upon him, he soon achieved recognition as the leader of the exiled patriots. After Italy's surrender he went to Rome in late 1943 and helped to establish the new government. Twice thereafter he was minister without portfolio and on Feb. 2, 1947 became foreign minister in the coalition Cabinet of A. de Gasperi. Ill health forced his retirement on July 26, 1951.

Among his books in English are *Makers of Modern Europe* (1931); *Pachich and the Union of Yugoslavia* (1939); *The Real Italians* (1941); *Contemporary Italy* (1944).

DRAKE DE KAY.

SGAMBATI, zgäm-bä'tē, **Giovanni**, Italian musician: b. Rome, May 28, 1841; d. Dec. 15, 1914. He studied at Trevi, Umbria, and in 1860 removed to Rome. There he gained the friendship of Liszt, whose teaching and influence were of inestimable benefit to him. He became known as a conductor, composer and pianist, and as an interpreter of German music in Italy. He was professor of pianoforte at the Academy of Saint Cecelia from 1877; and in 1897 he founded the Nuova Societa Musicale Romanà. His pianoforte pieces won wide success and he also composed a requiem mass, three symphonies, several concertos, overtures, and organ pieces.

SGANARELLE, zgä'nä'rĕl', a comic character in ancient comedies, frequently used by Molière, with whose plays he is generally associated. He is introduced by Molière in *Sganarelle, ou le cocu imaginaire* (1660). He appears also in *Don Juan, ou le festin de Pierre* (he is Leporello in the opera *Don Giovanni*); and in *L'Amour du médecin; Le médecin malgré lui; Le mariage forcé*, and others. The character as handled by Molière is the source of many popular proverbs.

SGRAFFITO, z'-gräf-fē'tō, a term applied to certain methods of mural decoration and of pottery work. In the former, two coats of plaster of contrasting colors are applied and the outer layer is excised so as to expose the color underneath in the required pattern. The effect thus produced resembles, at a distance, that of a colored bas-relief design. In pottery, the term is applied to the process by which a clay of one color is superimposed upon one of a different, and a design produced by cutting the outer coating. This method of decorating earthenware is probably of Italian origin.

SHABAKA, shăb'ă-kă (Gr. SABACON), first king of the 25th (Ethiopian) dynasty, reigning from 712 to 700 B.C. He was a brother of Piankhi (c.741–721 B.C.), the Ethiopian king who, advancing north from his Nubian capital of Napata on the Nile near the 4th Nile Cataract (its site is just south of the present village of Kareima, Sudan), conquered virtually the entire Nile Valley, including Memphis and most of the delta cities. Piankhi thus became the real ruler of the 23d (Tanite) dynasty and initiated a 60-year period of Ethiopian sovereignty over Egypt.

Shabaka, though supreme in Egypt, was of no assistance to the Jews against their mutual enemies, the Assyrians. His successor, Shabataka, who was probably his son, reigned until 688 B.C. Shabaka's nephew Taharka, third king of the 25th dynasty, ruled from 688 to 663 B.C. In 667 he was driven back to Upper Egypt by the Assyrian King Ashurbanipal, but maintained his rule there until his death.

SHABONEE, shăb'nē, Potawatomi Indian chief: b. possibly near the Maumee River in Ohio, c.1775; d. Grundy County, Ill., July 1859. His father, an Ottawa, is said to have been a nephew of Pontiac (q.v.). Shabonee (variant spellings are Shabbona, Shobonier, Shaubena, Chambler, Chambly) married the daughter of a Potawatomi chief, and on the chief's death succeeded him. After a brief stay in a Potawatomi village on the Illinois River near the mouth of the Fox, he removed to a place in the present southern DeKalb County, Ill., which came to be known as Shabbona Grove. About 1807 he came under the influence of Tecumseh (q.v.) and accompanied him in 1810 on a tour of the northern Illinois country, helping him to form his confederation of tribes. However, after the outbreak of the war of 1812, he refused to participate in attacks on the settlers and saved the lives of several white families at the Chicago massacre of August 1812. Yet he fought on Tecumseh's side at the battle of the Thames (1813). After the restoration of peace he remained firm in his allegiance to the United States. During the Black Hawk War in 1832 he again protected the settlers, sending his son and nephew to warn those at Holderman's Grove and the Fox River, while he himself galloped to warn the settlements at Bureau and Indian creeks. Their descendants in 1903 erected a monument to him and in 1906 dedicated a park to his memory. Despoiled of his lands in his old age, he was given a small farm where he died in poverty.

SHABUOTH, a Jewish feast, known also as the Festival of the Weeks; the most joyous of all the ancient Hebrew holidays. It was originally called the Feast of the Barley.

SHACKAMAXON, shăk-ă-măk'sŏn, **Treaty of,** the compact, traditionally called the "Great Treaty," made by William Penn with the Delaware Indians at their village of Shackamaxon (now Kensington, a part of Philadelphia). Soon after his arrival in the province of Pennsylvania in the fall of 1682 Penn entered into negotiations with the Indians, seeking to establish friendly relations with them. After a number of meetings, on June 23, 1683, under a great elm tree at Shackamaxon several engagements were signed by the chiefs and duly witnessed by whites and Indians. They granted to Penn and his heirs large areas of southeastern Pennsylvania. The chief Indian representative was the sachem Tammanen (Tammany). A century later Benjamin West commemorated the treaty in a painting, while Voltaire alluded to it as "the only treaty never sworn to and never broken." Penn himself described the seating arrangements of one of the meetings in a letter of Aug. 16, 1683, to the Free Society of Traders.

SHACKLETON, shăk'l-tŏn, Sir **Ernest Henry,** British explorer: b. Kilkee, Ireland, Feb. 15, 1874; d. at sea, off S. Georgia Island, Jan. 5, 1922. He was educated at Dulwich College, served in the merchant marine and was a lieutenant in the Royal Navy Reserve. He was third lieutenant under R. F. Scott in the National Antarctic Expedition in 1901–1904, and with Scott reached lat. 82° 17′ S., the farthest point south then touched. He was secretary and treasurer of the Royal Scottish Geographical Society in 1903–1906. In 1907–1909 he commanded the British Antarctic Expedition, and succeeded in reaching lat. 88° 23′ S., Jan. 9, 1909, establishing a new record. He also ascended Mount Erebus, 13,120 feet high, and reached the south magnetic pole Jan. 16, 1909, determining its position as lat. 72° 25′ S., long. 154° E. He headed a third expedition in 1914–1916, crossing Antarctica from Coat's Land to McMurdo Sound and making valuable geologic and scientific surveys. He was awarded the special gold medal of the Royal Geographical Society, the King's Polar medal with two bars, and gold medals from the Royal Scottish Geographical Society, as well as from the geographical societies of Denmark, Belgium, France, Antwerp, Italy, America, Paris, and Russia. He was knighted in 1909 and was an officer of the Legion of Honor. He was author of *Heart of the Antarctic* (1909); *Diary of a Troopship; South* (1919).

SHACKLETON, Robert, American writer: b. Wisconsin, Dec. 26, 1860; d. Hyeres, France, Feb. 24, 1923. He studied law in Michigan, was admitted to the Ohio bar, was journalist in New York five years, was in Philadelphia as associate editor of *The Saturday Evening Post* two years.

He published *Toomey & Others* (1900); *Many Waters* (1902); *The Great Adventurer* (1904); *The Quest of the Colonial* (with Elizabeth Shackleton, 1907); *Adventures in Home-Making* (1910); *A Living Without a Boss* (1911); *Unvisited Places of Old Europe* (1913); *The Charm of the Antique* (with Elizabeth Shackleton, 1915); *Four on a Tour in England* (1915); *Life of Russell H. Conwell* (1916); *The Book of Boston* (1916).

SHAD, *Alosa sapidissima,* a member of the herring family, Clupeidae. This fish runs from Labrador to Florida and has been transplanted successfully to the Pacific where it is now found from Alaska to southern California. It is also present, although rare, in the Lake Ontario basin.

River names are often attached to the common name of this fish, that is, Delaware River shad, Hudson River shad, etc., but this does not imply a separate species.

The shad is blue or blue-green on its back and upper sides; silvery below. Above the gill-cover there is a dark spot, and frequently others along the base line of the blue color.

The fish has a single, short, spineless dorsal fin consisting of about 15 rays. The tail is deeply forked. There are some 60 scales in a series running from gill-cover to tail. The ventral edge of the body is sharply compressed. The toothless

Shad, *Alosa sapidissima.*

jaws fit into each other, a peak in the center of the lower slipping into a notch on the upper. The gill-rakers are long; about 55 on the lower branch of the first gill-arch. A silvery patch on the scaleless cheek is deeper than long. Young shad are more slender than the adults.

The shad reaches a weight of 14 pounds and a length of 30 inches. The females run larger than the males, their average is 4 to 5½ pounds; the males average 2½ to 4 pounds.

The food of this fish consists of insects and insect larvae, very small fishes and crustaceans. It is also known to eat minute plant form.

The shad is primarily a marine fish, but goes into fresh water to spawn. This spawning migration starts from the sea up to the rivers when the water temperature reaches between 50 and 60°F. which is the necessary temperature for their spawning. The males reach the spawning grounds first. During spawning the fish pair, swimming together. The eggs are deposited in shallow water and sink to the bottom. The adults, having spawned, return to the sea. Spawning migration in the north begins toward the end of May; in the south, its peak is in February. A female averages about 28,000 eggs but has been known to contain as many as 156,000. The eggs hatch in about six days. The fry stay in fresh water until colder weather starts them toward the sea, by which time they are between 4 and 5 inches long. They become mature in their third or fourth year.

Because the shad is such a profitable fish commercially, millions of young are hatched artificially and released. There has been considerable depletion of the supply, however, by over-fishing, as it is easy to net them when they are in great schools in the lower reaches of rivers. Pollution has also depleted this population. They are taken in gill or trammel nets. The fish is eaten fresh and despite its innumerable small bones, is a delicious food fish. Shad roe, so popular in the east, is not so in the west, and most of the large catch taken in the Sacramento-San Joaquin region is shipped to eastern markets.

Shad when in fresh or brackish water on the way to the spawning grounds is a fine game fish. It is usually taken on casting or spinning tackle. The mouth is very delicate.

Two shads are found in Europe, the allis shad, *Clupea aloas*, and the twaite shad, *Clupea finte*. The former is not numerous and is found in the Shannon River in Eire, and the Severn and several other rivers of the west coast of England. It is also found in the Rhine as far up as Basle, Switzerland, and in the Elbe in Germany. In France it goes very far up the Seine and the Loire rivers.

The twaite shad is distinguishable from the allis by dark spots on the body above the midline and less numerous and shorter gill-rakers. It spawns later in the season than the allis, and only at night. It is known to be land-locked in lakes of Switzerland and northern Italy, particularly in Como and Garda. This shad is also found in the rivers of the British Isles, but is more common in the Mediterranean and Baltic areas, although it has not been reported from Russia.

This is the fish called in Germany the *maifish* because of its May spawning season.

Consult Greeley, J. R., *A Biological Survey of the Lake Ontario Watershed* (Supplement, 29th Anniversary Report, New York State Conservation Department, Albany 1939); Hubbs, C. L., and Lagler, K. F., *Fishes of the Great Lakes Region* (Bloomfield Hills, Mich., 1947); Breder, C. M., *Field Book of Marine Fishes*, rev. ed. (New York 1948); Roedel, P. M., *Common Marine Fishes of California* (State of California, Department of Natural Resources, Division of Fish and Game, Fisheries Bulletin No. 68, 1948); Gabrielson, I. N., and La Monte, F. R., eds. *Fisherman's Encyclopedia* (New York 1950).

CHRISTOPHER W. COATES,
Curator, The Aquarium, New York Zoological Society.

SHAD FLY. See MAY-FLY.

SHADBUSH. See AMELANCHIER.

SHADDOCK, a small tree (*Citrus decumana*) of the order Rutaceae. It is a native of the Malay Archipelago, whence it has been introduced into India, the West Indies, Florida, California and other warm climates for its fruits. It is a small tree about 25 feet tall, with large ovate leaves, large white flowers and light yellow or pink fruits, with sweet or acid pale yellow or reddish pulp, arranged in sections like those of the orange. In some horticultural varieties the fruits are more than six inches in diameter, and weigh more than 10 pounds. The true shaddocks are pear-shaped and are seldom found in the northern markets, since the round fruited kinds or "pomelos" are in America considered more valuable for shipping. The name "grape-fruit" is often applied to the shaddock because it is produced in clusters somewhat resembling grapes. Other popular names are forbidden fruit, fruit of paradise, pumelo, pompelos and variations of spelling. The tree is somewhat larger than its relative, the orange, and is planted about 30 feet apart. It is found to be most satisfactory when budded upon its own stock, or that of the sour or sweet orange, the first being preferred by many growers. It is considered more tender than the orange and in the United States is grown only in the lower part of the Florida Peninsula and warmer California. The cultivation, fertilization and management are practically the same with the above exceptions to those of the orange and lemon (qq.v.).

SHADES OF DEATH, a name given in maps printed prior to 1788 to the densely forested northern part of the Great Swamp in Luzerne County, Pa., about 12 miles from Wilkes-Barre. Some of the fugitives from the Wyoming massacre of July 3-6, 1778 found refuge here.

SHADOOF, shä-dōōf′, an ancient Egyptian contrivance for raising water. It is extensively in use in the East for drawing water for irrigation purposes, and its prototype is found in use in the South in the United States, where it is employed to draw water from the open "surface" wells. The machine consists of a cross-bar on two uprights; suspended on this horizontal bar is a long rod or branch of a tree, so fixed as to work as on a fulcrum, the long end or lever pointing upward and over the water, usually a river or stream, and the short end behind the bar and nearest the ground. On the short end is affixed a weight of rock or dried mud, to act as a counterpoise to the long end. From the end of the long portion a bucket is suspended. When not in use the shadoof naturally rests with the short weighted end next to the ground and the long end, with dependent bucket, in the air. When it is desired to draw water the bucket is pulled down (by a rope attached to the long end) and is dipped under the water; on account of the weight at

the other end it is now easy to tip the shadoof, again bringing the bucket into the air where it can be poured into any object on the bank desired — often a hole, from which a runnel conveys the water to irrigation ditches. Shadoofs are often made two or more, side by side, or a succession of them along the bank to be used at different stages of the water.

SHADOW, the darkness caused by the interposition of an opaque substance between a luminous point or body and the place upon which the shadow is thrown. When the substance that casts the shadow is in open space, the form of the shadow is that of a section of the substance made at right angles to the direction of the ray of light. When the body casting the shadow is larger than that which emits the light the shadow goes on constantly increasing in diameter the further it goes; when it is of the same size with the latter, the shadow is unlimited in length, but always remains of the same diameter; and when it is smaller the shadow gradually diminishes to a point, where it terminates. The intensity of the shadow depends upon the degree of transparency, translucency or opaqueness possessed by the substance interposed between the point of light and the place on which a shadow is cast.

SHADOW PLAY, or **SHADOW PANTOMIME,** a theatrical performance acted by puppets or persons, whose shadows are thrown upon a screen by means of a light placed back of the performers. The idea is of great antiquity and is thought to have originated in China. It has long been a favored entertainment in Japan, the Malay Archipelago, throughout southern and western Asia, Egypt and eastern Europe. It was introduced in France in the 18th century, and like the puppet shows and pantomimes, became popular as an entertainment for children. It is revived from time to time, usually in vaudeville or cabaret acts.

SHADWELL, Arthur, English physician: b. 21 Sept. 1854; d. 21 March 1936. He graduated at Keble College, Oxford, and after studying medicine practised from 1883 to 1887 at Brighton. In 1889 he abandoned medicine for travel and investigation. He visited the countries of Europe and Canada and the United States, studying their economic, social and industrial conditions, and contributed articles on these subjects to many magazines and newspapers. His books include: 'The London Water Supply' (1899); 'Drink, Temperance and Legislation' (1902); 'Industrial Efficiency' (1906); 'Drink in 1914–1922' (1923); 'The Socialist Movement'; 'Typhoeus or The Future of Socialism' (1929).

SHADWELL, Thomas, English dramatist and poet laureate: b. Stanton Hall, Norfolk, about 1640; d. London, 19 Nov. 1692. He was educated at Cambridge and subsequently studied law. His comedy, 'The Sullen Lovers' (1668), was successful and he thereafter devoted himself to literature. He wrote 17 plays, the most of them modeled on the style of Ben Jonson, which caricatured with genuine humor, though somewhat coarsely, various eccentricities in the manners of the day. After the Revolution he became, in 1688, poet laureate and royal historiographer, succeeding Dryden and thereby incurring the enmity of that poet, who made him the hero of his clever satire, 'MacFlecknoe.' His death was supposed to be due to an overdose of opium. His poetry was of little merit, but his dramatic pieces, though of only temporary reputation, were much lauded in their day. They include 'The Virtuoso' (1676); 'Lancashire Witches' (1682); 'Volunteers, or the Stock-jobbers' (1693), etc. His collected 'Works' were published in four volumes (1720). Consult Gray, W. F., 'Poets Laureate of England: Their History and their Odes' (London 1914), and Ward, A. W., 'History of English Dramatic Literature (3 vols., New York 1899).

SHAEF. See Supreme Headquarters, Allied Expeditionary Force.

SHAFFNER, Taliaferro Preston, American inventor: b. Smithfield, Va., 1818; d. Troy, N.Y., 11 Dec. 1881. He studied law and was admitted to the bar, but practiced little, his attention being largely absorbed by inventions, including the use of high explosives in blasting. In the early days of the telegraph he was an associate of Samuel F. B. Morse. He built the line from Louisville, Ky., to New Orleans and that from Saint Louis to Jefferson City in 1851, and held office in various telegraph companies. During the Dano-Prussian War of 1861 he was in the service of Denmark. He published the *Telegraph Companion: devoted to the Science and Art of the Morse American Telegraph* (1855); *The Telegraph Manual* (1859); *The Secession War in America* (1862); *History of America* (1863); *Odd Fellowship* (1875).

SHAFROTH, shăf'rŏth, **John Franklin,** American lawyer, governor and senator: b. Fayette, Mo., 9 June 1854; d. Denver, Colo., 20 Feb. 1922. He was graduated at the University of Michigan in 1875 and was admitted to the bar in 1876. He engaged in practice in Fayette until 1879, then removed to Denver, Colo., where he practised. He served in Congress in 1895–1905, was governor of Colorado in 1909–1913, and in 1913–19 was United States senator.

SHAFTER, shăf'tẽr, **William Rufus,** American military officer: b. Galesburg, Mich., 16 Oct. 1835; d. near Bakersfield, Cal., 12 Nov. 1906. At first a farmer, on the outbreak of the Civil War he entered the Seventh Michigan Infantry. He participated in the battles of Fair Oaks, Savage Station, Glendale and Malvern Hill; was appointed major 5 Sept. 1862; was taken prisoner at Thompson's Station, Tenn., in March 1863 and exchanged in May of the same year; was made lieutenant-colonel 5 June 1863 and became colonel of the 17th United States colored troops 19 April 1864; brevet brigadier-general of volunteers for gallant and meritorious services during the war; and was mustered out of the volunteer service 2 Nov. 1865. He entered the regular army and became lieutenant-colonel of the 41st Infantry 26 Jan. 1867; assigned to the 24th Infantry 14 April 1869; colonel of First Infantry 4 March 1879; and brigadier-general 3 May 1897. On the breaking out of the Spanish-American War he was given command of the army mobilized for the invasion of Cuba; his first decisive move was the landing of 16,000 men at Daiquiri, Cuba, on 21 June 1898, in about 12 hours without an accident. He conducted the military operations resulting in the surrender of Santiago de Cuba.

After the war he commanded the department of California and Columbia, 1899–1901. Retired June 3, 1901. Consult, Sargent, H. H., *The Campaign of Santiago de Cuba* (3 vols., 1907).

SHAFTESBURY, shäfts'bŭ-rĭ, **Anthony Ashley Cooper,** 1st EARL OF, English statesman: b. Wimborne Saint Giles, Dorsetshire, 22 July 1621; d. Amsterdam, 21 Jan. 1683. He entered Exeter College, Oxford, whence he removed to Lincoln's Inn, with a view to the study of law; but was chosen representative for Tewkesbury in 1640. At the commencement of the civil war he sided with the king's party, though he appeared to deem mutual concession necessary. Finding himself in consequence of this opinion distrusted by the court he went over to the Parliament, from which he received the command of the parliamentary forces in Dorsetshire. When Cromwell turned out the Long Parliament, Sir Anthony was one of the members of the convention which succeeded. He was, nevertheless, a subscriber to the protestation which charged the Protector with arbitrary government, though this fact did not prevent him from becoming one of his privy council. After the deposition of Richard Cromwell he was privately engaged in a plan for the restoration of Charles II, which he subsequently aided with all his influence. He was one of the 12 members of the convention of 1660 who carried the invitation to the king, and was soon after made a privy councilor and a commissioner for the trial of the regicides. In 1661 he was raised to the peerage by the title of Baron Ashley, and appointed chancellor of the exchequer and a lord of the treasury. Yet he gave his strenuous opposition to two of the leading measures favored by the Crown, the Corporation Act in 1661 and the Act of Uniformity in 1662. Afterward his conduct changed and he was one of the members of the obnoxious Cabal (q.v.). He supported the Dutch war and issued illegal writs for the election of members of Parliament during a recess, and in 1673 supported the Test Act. In 1672 he was created Earl of Shaftesbury and Lord High Chancellor. His conduct on the bench was able and impartial. He had not, however, been a whole year in office when the seals were taken from him, probably through the influence of the Duke of York; and from that moment he became one of the most powerful leaders of the opposition. He made use of the Popish plot to force out the Earl of Danby's administration (1678) and produce the formation of a new one, in which he was himself made president of the council April 1679. Amid many violent party proceedings which followed the Habeas Corpus Act was passed. He remained in the administration only until October. In his hostility to the Duke of York, Shaftesbury is now supposed to have entered into connection with the Duke of Monmouth, with the view of supporting his claims to the Crown, a circumstance which gave rise to Dryden's satire of 'Absalom and Achitophel.' In consequence of this suspected design Shaftesbury was once more committed to the Tower and tried for high treason; but the grand jury before whom the bill of indictment was laid ignored it. Not long after this acquittal the earl withdrew to Holland, where he died. He was highly accomplished and easily the greatest politician and governor of parties in his time in England. Consult the biographies by W. D. Christie (London 1871) and H. D. Traill (ib. 1886); also Macaulay's 'History' (1848–55).

SHAFTESBURY, Anthony Ashley Cooper, 3d EARL OF, English moral philosopher: b. London, 26 Feb. 1671; d. Naples, 15 Feb. 1713. He was grandson of the preceding. After travel in Germany, France and Italy, he became (1695) the representative in Parliament of Poole, in Dorsetshire, and distinguished himself while in Parliament by his support of measures favorable to public liberty. In 1698 he gave up his seat, and visiting Holland in the assumed character of a student of physic, he prosecuted his studies, and became intimately acquainted with Bayle, Le Clerc and other literary men. In 1709 he published an 'Essay on the Freedom of Wit and Humor,' an 'Inquiry Concerning Virtue or Merit,' and 'The Moralist, a Philosophical Rhapsody,' being an eloquent defense of the doctrine of a Deity and providence. His 'Sensus Communis,' and his 'Soliloquy, or Advice to an Author,' followed in 1710. At the time of his death he was engaged in a work on the 'Arts of Design.' His works were collected and published together, under the title of 'Characteristics of Men, Manners, Opinions, and Times' (1711; rev. ed. 1714). A new edition by Hatch began to appear in 1870, but was never finished. As a writer he is remarkable for the elegance but also for the excessive artificiality of his style. In all his works Lord Shaftesbury appears a zealous advocate for liberty, and a firm believer in the fundamental doctrines of natural religion; but, although he professed a respect for Christianity, he was doubtless sceptical in regard to revelation. (See CHARACTERISTICS). Consult the works by Spicker (1872); von Gizycki (1876); Fowler, 'Shaftesbury and Hutcheson' (1882); also Rand, 'Unpublished Letters and Philosophical Regimen of the 3d Earl of Shaftesbury' (1900); Leslie Stephen 'Essays on Free Thinking and Plain Speaking' (new ed., New York 1905).

SHAFTESBURY, Anthony Ashley Cooper, 7th EARL OF, English philanthropist: b. London, 28 April 1801; d. Folkestone, Kent, 1 Oct. 1885. He was educated at Harrow and Oxford, and sat in the House of Commons during most of the period from 1826 to 1851, as member successively for Woodstock, Dorchester, Dorsetshire and Bath, but in the latter year succeeded to the peerage. He supported the administrations of Liverpool and Canning, and in 1828 he was appointed a commissioner of the board of control. Six years later he became a lord of the admiralty under Sir Robert Peel. From 1828, when he was appointed a member of a committee of inquiry into the treatment of lunatics, he constantly strove to improve the lunacy laws and administration; and it is largely due to his efforts that most of the worst abuses were removed. But his name must ever be chiefly associated with his noble and successful efforts to improve the condition of factory workers. About 1833 he first proposed the limitation of their working-day to 10 hours, and in spite of opposition his proposal became law in 1847. In 1842 an act was passed under

his direction for the improvement of the condition of colliery workers.

Though a Conservative, he supported the repeal of the corn laws. For 39 years he acted as chairman of the Ragged School Union, and he was also identified with various movements for securing better house accommodation for the working classes. He was president of the Bible Society, of the Pastoral Aid Society, of the Protestant Alliance and of other religious organizations. He was very popular with the masses of the population. He was an ardent evangelical in religious matters, and opposed to rationalistic beliefs and ritualistic practices. He published a volume of *Speeches* (1868).

Consult Hodder, Edwin, *Life and Work of the Earl of Shaftesbury*, 3 vols. (London 1886); Walpole, Sir Spencer, *Studies in Biography* (New York 1907).

SHAG, a cormorant, especially the *Phalacrocorax carbo*.

SHAGREEN, a kind of grained leather, of a close and solid substance, used for forming covers for cases, etc., which easily receives different colors. It is prepared in the East from the skins of wild asses, horses and camels. The most common color is sea-green (given by means of copper-filings and a solution of sal-ammoniac); but blue, red, black and other colors are also given it. Shagreen is also made of the skins of the sea-otter, seal, and shark.

SHAH, shä, the title given by western writers to the sovereign of Iran; in his own country he is known by the compound title Padishah. It is also used in other countries of central and southern Asia, and signifies a sovereign prince or king.

SHAH ALAM, shä' ä-lâm, Mogul emperor: b. June 15, 1728; d. Nov. 10, 1806. He was the last of the Mogul emperors to exercise even a nominal independence and ascended the throne in 1759. For 12 years he was exiled and he finally, in the endeavor to strengthen his authority over his empire, sought British friendship and granted to them Bengal, Bihar, and Orissa in exchange for the city and district of Allahabad. He put himself under the power of the Mahrattas in 1771, but in 1788 Delhi was seized by the Mohammedan rebel, Ghulam Kadir, who put out the emperor's eyes. From 1803–1806, under the protection of Lord Lake, who had defeated the Mahrattas, Shah Alam enjoyed a period of comparative affluence, thus peacefully ending his long and wretched reign.

SHAH JAHAN, shä' jà-hän', also **SHAH JEHAN**, shä' jĕ-hän' (known in his youth as PRINCE KHURRAM), Mogul emperor of Delhi: b. about 1592; d. 1666. He was fifth of the dynasty and in his youth was repeatedly in revolt against his father, Jahangir, upon whose death in 1627 he succeeded to the throne. His reign saw the Mogul empire at the height of its wealth and glory. He destroyed the kingdom of Ahmadnagar in 1636; and while he lost Kandahar to the Persians in 1653, he waged successful war against the Deccan princes in 1655. In 1658, when ill, he was seized by his son, Aurangzeb, and imprisoned the remainder of his life. His reign was distinguished further for its remarkable achievements in architecture. He built the Taj Mahal (q.v.) at Agra as a tomb for his wife, Mumtaz Mahall; the Pearl Mosque at Agra; the palace and Great Mosque at Delhi, which city he founded; and also built the celebrated Peacock Throne, the value of which has been estimated at $30,000,000.

SHAH NAMEH, shä' nä-mé (BOOK OF THE KINGS), is the Persian national epic. Consisting of 60,000 rhymed couplets, it is the life's labor of Firdausi (q.v.), who was born about 935 A.D., died in 1020, and is unquestionably one of the world's great poets. The epic sings the story of the Persian people from their beginnings under Gayāmarth, through the golden age of the half-millennium reign of Jamshīd, down to the conquest of the Sassanids by the Arabs and Islam in the 7th century. It is no accident that in the epic the glorious age of Jamshīd should have been destroyed by the Arab Dahhāk, or Zanāk, who, tempted by Ahriman, became the epitome of evil and tyranny. Written in almost pure Persian, studiously avoiding the Arabic that had come to dominate Persian life and letters, this national epos articulates the long-developing renaissance of the Persian spirit in its reaction to the Arab conquest and lays the foundation of the golden age of Persian literature and thought in the next four centuries following Firdausi. Chanted ritually in the physical culture clubs (the Zūrkhāneh) of a later age of conquest the epic helped keep vigorous the physical and spiritual muscle of the Persian people. Recited in the homes and taught in the schools it has played no small part in the national revival of the 20th century.

The epic does not connect with history until the passages on Zoroaster and Alexander, who is Persianized as the son of Dārā (Darius) and the daughter of the Emperor of Rūm—this latter an example of numerous anachronisms in the poem. Subsequently the epic roughly follows Sassanid history. Of most interest, however, is the earlier portion dealing with legendary kings and heroes who created civilization and made Iran great and powerful. The first king, Gayāmarth, initiated the human saga by subduing the beasts and challenging the demons. He was followed by Hushang who discovered fire and invented the arts of agriculture and metallurgy. Tanmūrath subdued the demons, including their leader Ahriman, from whom he extorted the knowledge of writing. Civilization reached its climax in the great Jamshīd, who, aspiring to divinity, was defeated finally by Ahriman's servant Zahāk. But the latter's intolerable tyranny was challenged by the rebel smith, Kavādh, and overthrown by the invincible and youthful Farīdūn, of the royal race of the Kayān.

After the reign of Farīdūn a time of new troubles arose from his division of the realm among his three sons. Iraj, who received Iran, was murdered by his brothers Salm and Tūr, but avenged by his son Manūchihr, thus beginning the age-old feud between Iran and Turan. Here enter the great Iranian palladins, most famous of whom is Rustam, the Iranian Hercules, not unlike the Germanic hero Siegfried. The last and greatest of his seven mighty exploits is the slaying of the White Div, whose blood restores sight to the blind Shah, Kai Kā'ūs. This hero is best known to English readers from Matthew Arnold's poem, *Sohrab and Rustum*. Sohrāb, champion of Turan, is unwittingly slain by his father Rustam in tragedy which capriciously yet inexorably

moves to its terrible climax. Heroic tragedy is continued in the struggle between Rustam and Isfandiyār, who also has performed his seven great feats of prowess. This struggle also results in the victory of Rustam, but at the predicted price of his own demise soon thereafter. It would appear that this struggle represents a compromise between the rival claims of popular and priestly traditions, with the orthodox hero Isfandiyār receiving his eventual vindication by the prophetic touch of death on Rustam.

Imaginary and legendary rather than factual and historical, anachronistic and often tedious and repetitious, filled with strange conceits and excessive exaggerations, the epic, for all its faults, is a great work of art, characterized by sustained and splendid diction, brilliant imagery and metaphor, vivid and realistic description, melodious yet stately rhythm, fiery phrase and assonant sweetness. Unquestionably it is one of the world's literary masterpieces.

The standard editions of the epic are by Julius Mohl, 6 vols. (Paris 1831–1868), Turner Macan, 4 vols. (Calcutta 1822–1829), J. A. Vullers, and S. Landauer, unfinished, 3 vols. (Leiden 1877–1883). The only complete translation is by I. Pizzi in *Il Libro dei Rei,* 8 vols. (Turin 1886–1888). The best French translation is by Mohl, 7 vols. (Paris 1876–1878). The most extensive rendering into English is that in verse by A. G. and E. Warner, 6 vols. (London 1905–1915); there is an English abridgment by James Atkinson (London 1832, 1886, 1892).

For further details consult T. Noldeke, *Das iranische Nationalepos* (Strasbourg 1896), H. Ethé, *Neupersische Litteratur* (Strasbourg 1896); P. Horn, *Geschichte der persischen Litteratur* (Leipzig 1901); and E. G. Browne, *Literary History of Persia,* Vols. 1 and 2 (Cambridge 1902–09).

T. Cuyler Young,
Department of Oriental Languages and Literatures, Princeton University.

SHAHAN, shā'ăn, **Thomas Joseph,** American Roman Catholic educator: b. Manchester, N. H., Sept. 11, 1857; d. March 9, 1932. He was educated at the Montreal College; the American College, Rome; the Roman Seminary, and at the University of Berlin. He was ordained priest in 1882; was chancellor and secretary of the diocese of Hartford in 1883–1888; became professor of church history and patrology at the Catholic University of America in 1891, and from 1909 to 1928 was rector there. He was created domestic prelate of the Pontifical Court, Rome, with rank of monsignor, in 1909, and was consecrated titular bishop of Germanicopolis Nov. 15, 1914. He was a contributor to the leading Roman Catholic magazines; edited the *Catholic University Bulletin* in 1895–1909; and was associate editor of the *Catholic Encyclopedia* in 1905–1929.

He wrote *The Blessed Virgin in the Catacombs* (1892); *The Beginnings of Christianity* (1903); *Saint Patrick in History* (1905).

SHAHAPTIAN INDIANS, shä-hăp'tĭ-ăn, a linguistic stock of North American Indians, the name of which is adopted from the Kootenay name of the Nez Percés, one of its principal tribes. The divisions of the stock occupied a large section of the country along the Columbia and its tributaries in what is now northeastern Oregon, southeastern Washington, and southwestern Idaho, extending from about long. 114° 30′ W. to 121° W., and between lat. 44° N. and 46° N. Their western boundary was the Cascade Mountains; their westernmost bands, the Klikitat on the north, the Tyigh and Warm Springs on the south, enveloping for a short distance the Chinookan territory along the Columbia which extended to the Dalles. Shahaptian tribes extended along the tributaries of the Columbia for a considerable distance, especially along Snake River, their eastern boundary being interrupted by the Bitterroot Mountains. The customs and habits of the tribes composing the stock were fairly homogeneous, the family organization was loose, and the clan system did not prevail. They subsisted chiefly on salmon and on roots and berries, and after the introduction of the horse did more or less hunting. Agriculture was not engaged in, and the villages were of temporary character owing to the necessity of frequently shifting residence in search of food. With the exception of the outbreak of the Nez Percés under Chief Joseph in 1877, due to the failure of the government to fulfill its treaty obligations with the Indians, the Shahaptian tribes were generally peaceful. The principal tribes or bands of the stock, with their present location (1944), are Yakima, 3,001 under Yakima agency, Washington, and perhaps 300 not under an agent; Nez Percé (Chopunnish), 1,500 under Nez Percé agency, Idaho, and 150 under Colville agency, Washington; Klikitat, about 175 under Yakima agency, Washington; Paloos, unknown number under same agency; Tenaino, 70 under Warm Springs agency, Oregon; Tyigh, about 430 under same agency; Umatilla, 123 under Umatilla agency, Oregon; Wallawalla, 624 under same agency; Tukspush or John Day Indians, about 60 under Warm Springs agency.

SHAHJAHANPUR, shä-jä-hän'po͝or, city, India, in central Uttar Pradesh, 100 miles northwest of Lucknow. Its chief industries are agriculture, sugar refining, and distilling. The export trade consists of sugar, pulses, and cereals. The town was founded in 1647 by the Mogul emperor Shah Jahan whose name it bears. Its most interesting architectural features are several fine mosques and the ruins of an ancient castle. In the mutiny of 1857–1858, it was one of the active seats of the rebellion. Pop. (1941) 110,163.

SHAIRP, shârp; shärp, **John Campbell,** Scottish poet and miscellaneous writer: b. Houston, West Lothian, July 30, 1819; d. Ormasary, Argyllshire, Scot., Sept. 18, 1885. He was educated at Glasgow University and Balliol College, Oxford, and after a term as assistant master at Rugby, he was appointed assistant professor of Latin at St. Andrews in 1857, and professor in 1861. In 1868, he was made principal, and thereafter was generally known as Principal Shairp.

From 1877, he also held the chair of poetry at Oxford. As a critic and expositor Shairp was markedly illuminating and careful. His works include *Kilmahoe and High Pastoral and Other Poems* (1864); *Studies in Poetry and Philosophy,* including essays on Wordsworth, Coleridge and Keble, which furnish some of the best of his writings (1868; 4th ed., 1886); *Culture and Religion* (1870); *Life and Letters of J. D. Forbes* (1873), *Poetic Interpretation of Nature* (1877); *Burns* (1879); *Aspects of Poetry* (1881). Posthumous collections are *Sketches in History and Poetry* (1887) edited by W. Veitch; and *Glen Desseray and other Poems* (1888), edited by Palgrave.

Consult Knight, W. A., *Principal Shairp and his Friends* (London 1888); and the article by Dean Boyle in the *Guardian* for Sept. 30, 1885.

SHAKER HEIGHTS, residential city, Ohio, altitude about 1,000 feet above sea level, about eight miles from the city of Cleveland, on federal and state highways. There is also an electric railroad which connects Shaker Heights with downtown Cleveland. There are no industries but there are a number of retail businesses which serve the city.

History.—About 1820 a society of Shakers established a colony within the limits of the present Shaker Heights. The property of this colony was owned in common and the members had community interest in it. The membership eventually declined until the colony disbanded in 1889 and sold its property, consisting of about 1,367 acres, to a Buffalo syndicate. The property was acquired from this syndicate by O. P. and M. J. Van Sweringen, who proceeded to develop it as a residential community. Other lands were acquired by the Van Sweringen brothers, and the community developed almost entirely under their control. The municipality was incorporated as a village in 1912, and became a city in 1931. The form of government is a mayor and council. Pop. (1950) 28,222.

SHAKERS, the common name of the United Society of True Believers in Christ's Second Appearing. Although originating in England the sect is wholly American, and presents in its several communities an interesting example of thrift, industry and good morals.

The founder of the Shaker sect was Ann Lee, born at Manchester, England, in 1736. Her father was a blacksmith, and she became at an early age the wife of a blacksmith. She was converted in 1758 by the preaching of Jane Wardlaw, a member of the Society of Friends, who exhorted the people to repent of their sins, declaring that the end of all things was at hand, that Christ was about to reign, and that his second appearance would be in a woman's form. Ann Lee also preached, and was put in prison at Manchester on a charge of disturbing the public peace. When released she began preaching again, and announced that the Lord Jesus had stood before her in prison, and had become one with her in form and spirit. She called herself "Ann the Word," but her followers gave her the title of "Mother Ann." She was persecuted and annoyed to such a degree that she emigrated to America with seven companions, and formed the first Shaker settlement at Watervliet, near Albany, N. Y. Here she also endured imprisonment with some of her followers who refused to bear arms in the War of Independence, on the ground that it was against their principles to serve as soldiers. Ann Lee died Sept. 8, 1784, having witnessed the founding of two new Shaker communities, one at Hancock, the other on Mount Lebanon, New Lebanon, N. Y., the first Shaker meeting house being established in the year following her death, at Mount Lebanon, which is still the most flourishing of the Shaker communities.

Joseph Meacham, one of Ann Lee's successors, gave to the Shakers their effective organization, which combines thorough business methods with strict adherence to the principles of their faith. There is no marriage, the two sexes occupying rooms in separate parts of houses, and when married couples join the society, they regard each other as brothers and sisters only. The men do the work of farm and garden, factory and shop, and some widely extended industries owe their origin to the inventive ability of the Shakers. The women cook and attend to the housework, every room being a model of cleanliness. They do much of the tailoring and repairing; prepare seeds and medicines for market, and make butter and cheese. Everybody is occupied.

Alcoholic liquors are known only as a medicine, and good health is so general that there is but little need for medicine of any kind. The use of tobacco is tabooed, and the diet, while both generous and varied, does not include flesh-meat or fish. The fact that Shakers live, as a rule, to an advanced age, and enjoy excellent health, is adduced in favor of abstinence from meat. It is also noted as significant that none of the Shakers suffer from cancer.

The Shaker belief agrees in certain respects with that of the Quakers, from whom the original Shakers were an offshoot. They give due respect to the civil law, but they reject ecclesiastical supremacy and military service. Members of the sect who had previously served as soldiers have refused to accept pensions after joining the Shaker community, and it was largely, if not chiefly on evidence of this fact that President Lincoln ordered the release of Shakers who had been imprisoned for refusing to serve, when drafted for the Civil War. The sum saved to the government in the refusal to accept pensions would have more than paid for substitutes for the Shakers who had been drafted.

The Shakers believe that God is king; that the sin of Adam is atoned, and that man is free of all errors except his own; that every human being will be saved, and that the earth is heaven, now soiled and stained, but ready to be brightened by love and labor. They believe in the immediate revelations of the Holy Ghost, and they regard angels and other spirits as maintaining companionship and intercourse with those who have been purified and exalted by the gifts of grace. Shakers believe that at death they merely throw off the bodily garment, and change the form of their existence, but no more. They expect no resurrection of the body, the spirit, when it has left the mortal frame, being done with it.

Consult Evans, F. W., *Shakers: Compendium of the Origin, History, Principles and Regulations, Government and Doctrines of the United Society of Believers in Christ's Second Appearing* (New York 1859); Hinds, W. A., *American Communities and Co-operative Colonies* (Chicago 1908).

SHAKESPEARE, William, English poet and dramatist: b. Stratford-on-Avon, Warwickshire; baptized there April 26, 1564; d. there April 23, 1616. His father, John Shakespeare, first appears in the town records in 1552, when he was fined for not removing a dunghill from before his door in Henley Street. He became prominent in town affairs: he was elected a chamberlain of the borough in 1561, alderman in 1565, and high bailiff (mayor) in 1568. He signed documents with a mark, but this is no longer supposed to prove that he was illiterate. From 1577 on to his death in 1601 there are many signs in the records of financial troubles; he is excused from a levy for the poor; he sells his wife's inheritance and he does not attend meetings of the Corporation, so that another is appointed alderman in his place.

Finally, in 1592 he is included in a list of nine who do not obey the law by going to church once a month, a note in the record signifying that this is for fear of process for debt. In 1596, however, he is described by the herald who made a rough draft of a coat of arms for him as a man who «hath lands and tenements of good wealth and substance, 500 li.»

The poet's mother was Mary, daughter of Robert Arden of Wilmcote, a wealthy landowner and relative of the aristocratic Ardens of Park Hall. Eight children were born to her, of whom William was the third child and oldest son. She died in Stratford in 1608.

Early Years.—No records exist of Shakespeare in his early years; something is known, however, about the Stratford Grammar School, which he presumably attended. The curriculum of such a school would have been adequate to provide the poet with the basis for such classical learning as he had—perhaps more than Ben Jonson's «small Latin and less Greek» would suggest, and rather less than some modern commentators suppose.

The two principal legends about his life in the country are that he was apprenticed to a butcher, for whom «when he killed a calf, he would do it in high style, and make a speech,» and that he fled Stratford because he was caught deer-poaching in the park of Sir Thomas Lucy of Charlecote. These stories cannot now be traced back farther than the late 17th century, about a hundred years after the events are supposed to have happened.

Marriage.—The first record of William Shakespeare after his christening is a license for marriage, 27 Nov. 1582, in the episcopal register of the diocese of Worcester. The bride's name is given as Anne Whateley of Temple Grafton. The next day a bond of £40 was entered to secure the marriage, without trouble, of Shakespeare and Anne Hathway or Hathaway, of Stratford. The sum was posted by two yeoman friends of the bride's father, Richard Hathway of Shottery, parish of Old Stratford, whose will had been proved in the preceding July. Anne Whateley and Anne Hathway are probably the same person, and since the latter is traceable, the Whateley entry is probably a clerk's mistake. The special license to which these records refer provided for a marriage after only one asking of the banns; the usual three banns would have carried the wedding into a prohibited period on the church calendar and delayed it for about two months. This delay would have been undesirable because Anne was already pregnant; the baptismal register at Stratford records the christening on 26 May 1583 of Susanna, daughter of William Shakespeare. On 2 Feb. 1585, the same register records the christening of twins, Hamnet (a variant of Hamlet) and Judith, apparently named for a Stratford baker, Hamnet Sadler, a beneficiary and witness of the poet's will, and his wife Judith. Shakespeare's wife bore him no other children; she lived until 1623 and the inscription on her grave records the fact that she was then 67 years old, which would make her about eight years older than her husband.

Nothing is known of Shakespeare's life between the christening of the twins and the first record of his appearance in the theater in London as actor and playwright. Seven or eight years, from about 1584 to 1592, are blank so far as the records go. The actor Beeston, whose father was a member of Shakespeare's company, many years later told John Aubrey that Shakespeare had been a schoolmaster in the country. Because of the academic flavor of such early plays as 'The Comedy of Errors' and 'Love's Labour's Lost' (q.v.), this tradition has found favor with modern biographers. There is no record of Anne Shakespeare in London during her husband's stay there, nor is there anything in Stratford until 1597, when Shakespeare, an established man of the theater, bought New Place.

London, 1592.—In September 1592, Robert Greene, the dissipated University wit, died in poverty and misery in London, leaving a pamphlet called 'A Groatsworth of Wit, bought with a million of Repentance.' In an epilogue he warned three of his friends who wrote plays (probably Marlowe, Peele, and Nashe) against the players, who live on the efforts of writers and then neglect them in their hour of need. «Trust them not,» he says, «for there is an upstart crow, beautified with our feathers, that with his *Tiger's heart wrapped in a player's hide,* supposes he is as well able to bombast out a blank verse as the best of you; and being an absolute *Johannes fac totum* is in his own conceit the only Shake-scene in a country.» This evidently refers to a presumptuous actor, not a University man like Greene and his friends, who has dared to write blank verse plays and is versatile enough to be a threat to them. That the jack-of-all-trades is Shakespeare seems clear from the fact that the «Tiger's heart wrapped in a player's hide» is a parody of a line in III 'Henry VI' and from the pun on his name. Later in the year, Henry Chettle, who had seen Greene's pamphlet through the press, apologized in the preface to his own 'Kind-Heart's Dream.' Marlowe and Shakespeare had apparently resented the attacks in Greene's book (Marlowe, though warned against the players and Shakespeare, had been called an atheist and Machiavellian) and Chettle expressed the wish that he had moderated more of Greene's bitterness than he did. «With neither of them that take offense was I acquainted, and with one of them I care not if I never be. The other, whom at that time I did not so much spare, as since I wish I had, . . . I am as sorry as if the original fault had been my fault, because myself have seen his demeanour no less civil than he excellent in the quality he professes [profession he follows, i.e. acting]. Besides, divers of worship have reported his uprightness of dealing, which argues his honesty, and his facetious grace in writing, that approves his art.»

By the end of 1592, then, Shakespeare had become an actor, written plays, attracted the jealousy of a University-trained poet and hack writer and won the respect of Chettle and «divers of worship» for his civility, his honesty, and his excellence as player and writer. Why he left Stratford, and his wife and children, for London, and how he got a start in the theater, nobody knows. The well-known legend that he began by holding gentlemen's horses at the playhouse door comes down from Sir William Davenant, the wild and eccentric 17th century poet, playwright, and theater manager who sometimes claimed to be Shakespeare's bastard son. There are other legends that he was first a

«servant» in the theater, and that he was first a prompter's assistant or call boy.

Early Poems.—From 1592 to 1594 the theatrical companies were somewhat disorganized because of the plague, and it is during these years that Shakespeare presented himself as a poet. His 'Venus and Adonis' was entered for publication 18 April 1593 by the printer Richard Field, a fellow townsman of Shakespeare's, three years his senior, who had come up to London in 1579. The poem was dedicated to the young Earl of Southampton, a favorite patron of writers of amatory verse, and some sort of monetary acknowledgment was probably given by the nobleman, although the old legend that once he gave the poet £1,000 is incredible. The dedication refers to 'Venus and Adonis' as «the first heir of my invention» [*i.e.*, his first published work] and Shakespeare promises «some graver labor» if this one is found acceptable. The promise was kept a year later, by the dedication of 'The Rape of Lucrece,' in which the poet says he has warrant of the earl's disposition which makes this second offering assured of acceptance. «What I have done is yours,» he says, «what I have to do is yours, being part in all I have, devoted yours»—lines which seem to most readers to suggest an intimacy greater than that reflected in the first dedication.

Actor and Playwright.—Sometime in 1594 were formed the two principal acting companies of the later Elizabethan era, the Lord Chamberlain's men and the Lord Admiral's men. Technically personal servants of these officials, the actors could wear livery, thereby securing protection against prosecution under the old statutes which classified players with rogues and vagabonds. They received also some prestige as retainers of the court, since the puritanical authorities of the City of London looked on players and theaters with disfavor. Furthermore, the patron's license was a useful introduction to the local authorities when the companies toured in the provinces. When they were at home, the players earned their living by producing plays in a public playhouse; occasional performances at court, usually in the holidays, carried prestige but did not provide a major share of their income. In March 1595, the Treasurer of the Royal Chamber notes payment of £20 to William Kemp, William Shakespeare, and Richard Burbage, servants to the Lord Chamberlain, for the presentation at court in Greenwich of two «comedies or interludes» during the previous Christmas holidays. Shakespeare was then a leading member of the company and a «sharer,» or stockholder who participated in the profits. It was a position of some dignity and of considerable promise financially. The Chamberlain's men were to be the favorite court entertainers, giving 32 performances at court during Elizabeth's reign and becoming the King's men upon the accession of James I.

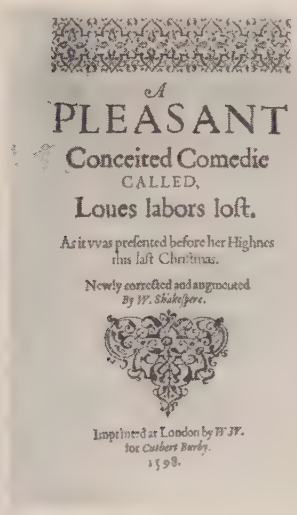
Shakespeare's position in the company, his financial obligations and returns, may be inferred from various legal documents from suits against members of the company in 1610, 1615, and 1619. The company consisted of actor-sharers (of which Shakespeare must have been one in 1594–95), hired men, and boys who played female parts and were assigned to the sharers on something like an apprenticeship basis. With the acquisition of theater property, the Globe in 1599 and the Blackfriars in 1608, some members of the company became investors in real estate—landlords or «housekeepers.» As originally leased, the Globe Theater was held in two moieties or halves, one by Richard and Cuthbert Burbage, and the other by Shakespeare, Augustine Phillips, Thomas Pope, John Hemings and William Kemp. Shakespeare's interest was therefore a tenth, but it varied as members dropped out or new ones were added. He held one-seventh interest in the Blackfriars after it was acquired by the company. He was still holding his share of the Globe when the theater burned in 1613, but whether he retained his interests to the end of his life is uncertain. The most recent and careful estimates of Shakespeare's income from theatrical sources give him about £50 annually to 1599, about £110 to 1608, and after retirement, about £60 to £70 from his interest as «housekeeper.» His income from the theater almost certainly never went over £175 or £200 at the most. Prices were generally so much lower in Shakespeare's time than now that this should be considered a very comfortable income. Shakespeare bought the second largest house in Stratford, for example, for £60, though it should be added that it was then in need of repair.

Shakespeare's first obligation to the company was as an actor; he is listed among the principal actors of Jonson's 'Every Man in his Humour' in 1598 and 'Sejanus' in 1603, but he does not appear in the lists after that date. The First Folio edition of his own plays, 1623, lists him among the actors but does not specify the plays in which he took part. Legend has assigned to him the minor roles of Adam in 'As You Like It' and the ghost in 'Hamlet.' But his chief contribution to the company was, of course, the plays. He provided, alone or in collaboration, 38 plays between 1590–91 and 1612–13, and his work constitutes the most substantial part of the company's repertory for the period. His relations with his fellows seem to have been very cordial; he received a small bequest in the will of Augustine Phillips, and he left money in his own will for memorial rings to Burbage, Hemings, and Condell. The devotion of the two latter actors to his memory is obvious from the prefatory matter to the First Folio, which they edited.

Biographical Records.—Some details of his personal life during his first decade in London have come down to us. His son Hamnet was buried 11 Aug. 1596 in Stratford. About the same time John Shakespeare, the poet's father, applied to the College of Heralds for a grant of arms, and a rough draft, drawn up by a herald, is dated 20 Oct. 1596. A note to a revised draft says that John Shakespeare possessed a pattern of the arms drawn up 20 years earlier, so this was apparently not the first time the poet's father had sought the insignia of a gentleman. It is usually suggested that William must have prompted the revival of interest in arms, since his father was not at this time in prosperous circumstances, as he had been 20 years before, whereas the son was now increasing in wealth and dignity. There are contemporary jokes about actors who seek or assume coats of arms, and a manuscript of 1604, or later, mentions Shakespeare's colleagues Phillips and Pope as using arms to which they were not entitled. The Shakespeare request was appar-

Above: The Guild Chapel and the Grammar School at Stratford on Avon, which Shakespeare probably attended as a boy. *Right:* The monument above Shakespeare's grave in Stratford's Holy Trinity Church, with the portrait bust by Geraert Janssen.

(Above) British Information Services; (right) Ewing Galloway; (center row) The Folger Shakespeare Library, photos by Theodor Horydczak

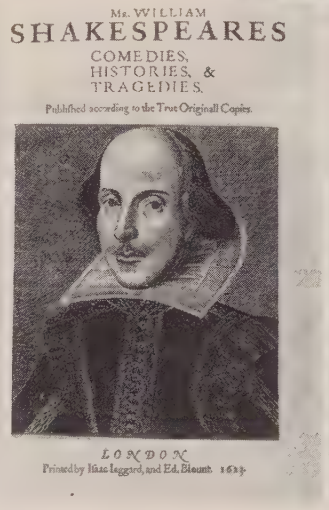


A
PLEASANT
Conceited Comedie
CALLED,
Loues labors loſt.

As it vvas preſented before her Highnes
this laſt Chriſtmas.

Newly corrected and augmented
By W. Shakeſpere.

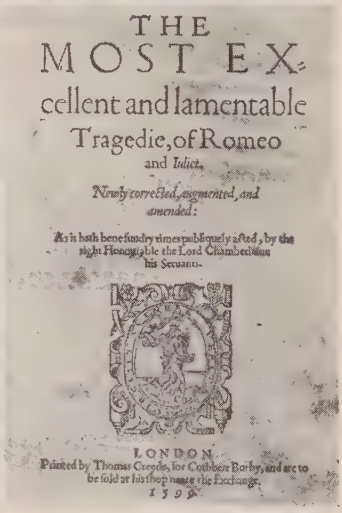
Imprinted at London by W. W.
for *Cuthbert Burby.*
1598.



Mr. WILLIAM
SHAKESPEARES
COMEDIES,
HISTORIES, &
TRAGEDIES.

Publiſhed according to the True Originall Copies.

LONDON
Printed by Iſaac Iaggard, and Ed. Blount. 1623.



THE
MOST EX-
cellent and lamentable
Tragedie, of Romeo
and *Iuliet.*

*Newly corrected, augmented, and
amended:*

As it hath bene ſundry times publiquely acted, by the
right Honourable the Lord Chamberlaine
his Seruants.

LONDON
Printed by Thomas Creede, for Cuthbert Burby, and are to
be ſold at his ſhop neere the Exchange.
1599.

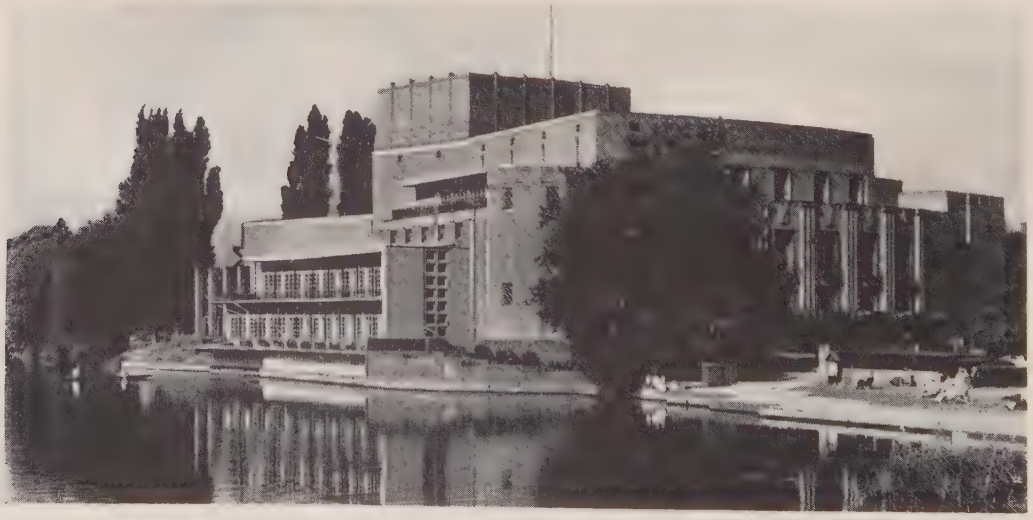
Left: Title page of First Quarto edition (1598) of *Love's Labour's Lost. Center:* Title page of First Folio edition (1623) of Shakespeare's plays. *Right:* Title page of Second Quarto edition (1599) of *Romeo and Juliet.*

Ewing Galloway

Ann Hathaway's cottage at Shottery, about one mile from Stratford.

Left: Drawing of the Globe Theatre during a performance of *Henry IV*. The stage is set out into the "pit," with seats around the sides of the circular theater and on the stage itself. *Above:* David Garrick and Mrs. Hannah Pritchard appear in contemporary costume in Garrick's production of *Macbeth* in 1763.
(Left and above) The Bettmann Archive; (below left and right) Harvard Theatre Collection; (below center) Pennsylvania Academy of Fine Arts

Left: Mrs. Sarah Siddons portrayed as Lady Macbeth. *Center:* Edmund Kean as Shylock in the painting by John Neagle. *Right:* Edwin Booth in the role of Iago.



British Information Services

The Shakespeare Memorial Theatre at Stratford on Avon.

ently granted, and the now familiar coat with the falcon and spear appears on the poet's monument in Stratford church. Three years later, leave to impale the arms of Arden was asked, but if this was granted, Shakespeare seems not to have made use of it.

In 1597 the records of the tax collectors give us some information about Shakespeare's London address. He is listed as one of the inhabitants of St. Helen's parish, Bishopsgate (a district not far from the Shoreditch theaters, The Theatre and The Curtain) who cannot be found to pay the tax, which for Shakespeare was 5s. The next year he is listed as owing 13s. 4d., and the collectors have traced him to the bishop of Winchester's liberty, the Bankside in Southwark (close to the site where the Globe Theater was to be built). There, presumably, he paid his taxes, for his name does not appear as a delinquent in future rolls.

In 1597 he purchased New Place in Stratford, the house he was to repair, retire to when he left London, and hand on in his family as far as his granddaughter, his last lineal descendant. The prosperity which this transaction suggests is also indicated by a letter from Abraham Sturley of Stratford to Richard Quyney in which Shakespeare is said to be willing to purchase some land in Shottery and by a letter from Quyney to Shakespeare asking the loan of £30. This is the only letter to or from Shakespeare in existence; Quyney's other correspondence suggests that the loan was promptly made. Also in 1598 when an accounting was made of corn and malt in Stratford, in an attempt to check hoarding during a shortage of grain, Shakespeare was credited with 10 quarters, or 80 bushels; only a dozen residents of Stratford had more. In the next year he invested in his share of the Globe Theater. In 1602 he purchased, for the large sum of £320, 107 acres of arable land in Old Stratford. His largest investment, however, was made in 1605; it was the purchase, for £440, of a moiety of certain tithes of three hamlets in Stratford. This produced, in 1611, an income of £60. In 1613 Shakespeare bought a gatehouse in Blackfriars, London, for £140.

Not much is known of Shakespeare's life in London aside from his work, and the few records we do have seem to raise as many questions as they answer. He was involved in two quarrels which got into the courts, but in neither case was he a principal. In 1596 he figured in a writ asking sureties of the peace against William Shakespeare, Francis Langley, Dorothy Soer and Anne Lee, on the part of one William Wayte. Langley, who had built the Swan Theater, had earlier sworn the peace against Wayte and his stepfather, William Gardiner. Shakespeare's part in the quarrel does not seem clear, but somewhat fantastic applications of it to characters in his plays have been offered. In 1612 he was a witness in a suit brought by Stephen Belott, a wigmaker, against his father-in-law, Christopher Mountjoy, over a marriage portion. Shakespeare is shown to have known the French Huguenot Mountjoy family since about 1602, to have lived in their house in Cripplegate for a time in 1604, and to have served, at Mrs. Mountjoy's request, as an intermediary to persuade the apprentice Belott to marry his master's daughter. But his testimony was useless, since he could not remember what marriage portion had been agreed upon eight years earlier. The suit was finally turned over to the elders of the French church in London, who decided for Belott but noted that both father and son-in-law were dissolute characters.

The little evidence we have concerning the habits and behaviour of Shakespeare is somewhat contradictory. The Bankside was not a «respectable» district; the brothels and bear-baiting pits were there, and it was frequented by the sporting element rather than by sober citizens. John Manningham, a law student, entered in his diary on 13 March 1602, a story that Shakespeare overheard Burbage making an assignation with a «citizen» at a performance of 'Richard III.' The actor was to announce himself as Richard the Third; Shakespeare got there first, was entertained, and when Burbage arrived and announced himself, the author sent down word that William the Conqueror was before Richard the Third. Against this gossip is the general statement of John Aubrey, who had it from Beeston, that Shakespeare «was not a company keeper» and «wouldn't be debauched.» From the little we know it must be concluded that he led a much more dignified and quiet life than Marlowe, Greene, Peele or Ben Jonson. The legends of his frequenting the Mermaid Tavern where he had wit combats with Jonson, and of the drinking bout in Stratford with Jonson and Drayton, come down from the 17th century.

Chronology of the Plays.—Shakespeare's plays were divided by the folio editors into comedies, tragedies, and histories. These are not clear-cut categories in fact, but they are useful. His earliest work was in the chronicle history play, the three parts of 'Henry VI' and 'Richard III' dated approximately 1590–92. But he tried comedy on classical models, 'The Comedy of Errors' (1592–93), 'The Taming of the Shrew' (1593–94), 'Two Gentlemen of Verona' and 'Love's Labour's Lost' (1594–95), and tragedy, 'Titus Andronicus' (1593–94) and 'Romeo and Juliet' (1594–95) as well. His comedy grew further in the direction of romantic and idyllic lyricism as he progressed, and intrigue and farce gave way to love as a principal motif. In 'A Midsummer Night's Dream' (1595–96), 'The Merchant of Venice' (1596–97), 'Much Ado about Nothing' (1598–99), 'As You Like It' and 'Twelfth Night' (1599–1600), Shakespeare reached the height of this development in comedy. At the same time he brought his history plays to a culmination in the cycle of the two parts of 'Henry IV' (1597–98) and 'Henry V' (1598–99), where the rich comic scenes of Falstaff and the eloquent patriotism which he had earlier exhibited in 'Richard II' transcend the limits of the form. The middle period of his career is devoted mainly to tragedy, with 'Hamlet' (1600–01), 'Othello' (1604–05) 'King Lear' and 'Macbeth' (1605–06), but including also the so-called «bitter» or problem comedies, 'Troilus and Cressida' (1601–02), 'All's Well that Ends Well' (1602–03), and 'Measure for Measure' (1604–05). The great tragedies are usually held to be the finest performance of European dramatic genius since the Greeks, for profundity of meaning and characterization, as well as for permanent effectiveness in the theater and magnificent beauty of expression. In the last period of his career he turned again to Roman history, which he had already drawn

upon in 'Julius Caesar' (1599–1600), and produced 'Antony and Cleopatra' (1606–07) and 'Coriolanus' (1607–08); but the most characteristic plays of this final period belong to the type called tragicomedies or dramatic romances. They include 'Cymbeline' (1609–10), 'The Winter's Tale' (1610–11), and 'The Tempest' 1611–12). These plays combine the melodramatic plots found in tragedy with the idyllic atmosphere and charming heroines of romantic comedy.

Various attempts have been made to relate the differences between the periods to Shakespeare's own attitude toward life—to say that he wrote tragedy "in the depths" and comedy "on the heights." The temptation to do so is probably irresistible, but it should be borne in mind that he was not a highly "subjective" writer, that he was influenced in his early and late periods by the successes of other men, and that he must have had more interest in the purely artistic problems confronting him than we can very well realize.

That Shakespeare was an artist is obvious: the quality of the plays cannot be the result of accident. But this does not mean that he was writing for readers. He was writing for the stage; he and his company profited mainly from the production, not the publication, of his plays; there is no evidence that he prepared any of his plays for the press. The question, then, of how his plays got from his own manuscript to our modern texts is of importance and interest.

Quartos and Folios.—Eighteen of his plays were published separately as quarto pamphlets; these were reprinted in the folio collection of 1623 and 18 unpublished plays were added. The editors of the folio, Shakespeare's fellows, Hemings and Condell, condemned the earlier quartos as "divers stolen and surreptitious copies, maimed and deformed by the frauds and stealths of injurious impostors"; in the folio, it was claimed, these plays were given "cured and perfect of their limbs" and the unpublished plays "absolute in their numbers as he conceived them." For over two centuries these words were taken literally, but modern research has shown that usually the folio editors reprinted an earlier quarto when there was one; often they used a recent quarto, with its accumulated misprints, rather than the earliest one. But they did often introduce changes, apparently from a playhouse manuscript. Furthermore, some of the quartos show signs of having been set up from Shakespeare's own manuscript or a very faithful copy of it. Prejudice against the quartos is well justified, however, in the case of six, now always called the "bad quartos"; they are the 'Romeo and Juliet' of 1597, the 'Henry V' of 1600, the 'Merry Wives' of 1602, the 'Hamlet' of 1603, and the 1594–95 editions of parts II and III of 'Henry VI.' These badly garbled texts certainly never came from the prompt copy or the author's manuscript. They were either taken down in faulty shorthand by an agent in the audience, or, more probably, constructed from memory by an actor or other employe of the company. Sometimes the version on which the reconstruction was based may have been a shortened form used on tour in the provinces. And there is always the possibility that different texts of a play originated before and after revision by the author or someone else.

Manuscripts.—No author's manuscript of a play in the folio has survived, but in recent years a strong case has been made out for Shakespeare's hand as one of those in a play of composite authorship called 'Sir Thomas More.' Most scholars, but not all, now believe that 147 lines on three pages of manuscript in the British Museum are in Shakespeare's own handwriting. If so, some confirmation has been found for the statement of the folio editors concerning their author's facility: "His mind and hand went together, and what he thought he uttered with that easiness that we have scarce received from him a blot in his papers." Ben Jonson's retort to this remark is characteristic and famous: "I remember, the players have often mentioned it as an honor to Shakespeare that in his writing, whatsoever he penned, he never blotted out line. My answer hath been: Would he had blotted a thousand, which they thought a malevolent speech. I had not told posterity this but for their ignorance, who choose that circumstance to commend their friend by wherein he most faulted, and to justify mine own candor, for I loved the man and do honor his memory (on this side idolatry) as much as any. He was, indeed, honest and of an open and free nature; had an excellent fancy, brave notions, and gentle expressions, wherein he flowed with that facility that sometime it was necessary he should be stopped: *Sufflaminandus erat,* as Augustus said of Haterius. His wit was in his own power; would the rule of it had been so too."

It is not surprising that no manuscripts of Shakespeare plays in the folio have survived; 20th century interest in original manuscripts should not be assumed to have existed in the 16th century. The author's manuscript, moreover, was of practical value as a working text of the play, and it would have been used rather than preserved. Upon completion of a play, the company had first to send it to the official licenser, who was the Master of the Revels. In Shakespeare's time this official was first Edmund Tilney and later Sir George Buck. He read it and affixed his signature to the manuscript (for which he got a fee) if the play seemed to him to be free from offense. The main interest of this censorship was political; 'Sir Thomas More' was not produced, for example, because the master found some of its speeches dangerous and would allow the play to appear only if considerable changes were made. Later, in King James' reign, there was a law against oaths, and the licenser was supposed to see that no profane matter crept in. If the play met with his approval, he signed a warrant on the last page, pocketed his fee, and returned the manuscript to the players. They then either had a transcript made or used the original for a director's copy. Notes of stage directions were made, sometimes with the names of the actors concerned; it is from such a note, carried over into print, that we know Will Kemp played Dogberry in 'Much Ado.' A "plot" or synopsis of scenes, with entrances noted, was drawn up to hang in the tiring room, and the parts for the individual actors to memorize were copied out from the manuscript. The problems of direction in the Elizabethan theater, the difficulties an author had to overcome before his play was produced as he wished, can best be inferred from Hamlet's advice to the players.

There Shakespeare shows a sensitiveness to diction («Speak the speech I pray you as I pronounced it to you, trippingly on the tongue»), a dislike of extravagant over-acting («O, it offends me to the soul to hear a robustious, periwig-pated fellow tear a passion to tatters»), a love of «the modesty of nature» and an annoyance at interpolated gags by a comedian («That's villainous, and shows a most pitiful ambition in the fool that uses it»).

The Elizabethan theater did not have the system of long runs of plays familiar to us. The company kept several plays in repertory during a season, and when the manuscript was no longer needed as a prompt copy, it would be put away until some occasion for revival, a tour in the provinces, or an opportunity to play at court came about. If, for any reason, the players decided to publish a play, the manuscript would have to undergo the vicissitudes of the printing house as well as those of the theater.

Sources—Shakespeare, like all other dramatists, drew not only upon life but upon books for his material. In several instances, notably 'King John,' 'The Taming of the Shrew,' 'Henry IV,' 'King Lear,' and 'Hamlet,' he rewrote old plays. For his English historical plays he turned for material to Raphaël Holinshed's 'Chronicle' (2d ed. 1586). He found there plenty of historical detail, brief and formal characterization, and the prejudices about English history of the 15th century which favored the Tudor interest. He used his material with freedom, taking motives out of their context, altering the ages of characters (e.g., Hotspur)—doing anything, in fact, which would increase the dramatic effectiveness of his play if it did not too seriously contradict general knowledge. History plays were popular in the decade following 1588 because of the renaissance of English patriotism after the Armada, and there are many indications that the Elizabethans considered the plays «true history,» as educational as the chronicles and much more entertaining. In the history play Shakespeare found opportunities for the study of character which served as preliminary exercises for his greatest achievements. Richard II, for instance, is a character who foreshadows Hamlet in part, and Richard III prefigures Iago.

A much richer book from the point of view of character portrayal provided him with the material for his Roman tragedies. This is Sir Thomas North's translation (1579) of Plutarch's 'Lives.' Here Shakespeare got not only complex biographical analyses of the heroes of antiquity, but also much that was useful for style. He versifies whole pages of North's prose; the most remarkable example is Enobarbus' description of Cleopatra's barge ('Antony and Cleopatra' II. ii, 198ff.). But there is still very great freedom in selection and utilization of material, and much that he uses is transformed by passing through the romantic imagination of the Englishman. Enobarbus is almost entirely Shakespeare's invention, and the citizens in 'Julius Caesar' he saw not in a book but on the streets of London.

Twice Shakespeare dramatized English novels: 'As You Like It' from Lodge's 'Rosalynde,' and 'The Winter's Tale' from the 'Pandosto,' of that Robert Greene who years before had called the poet an upstart crow. Many of his plays depend, directly or indirectly, upon Italian tales of love, adventure, and violence. Modern criticism has questioned whether there is always a unity between these adopted plots and the characters who enact them. If the disunity is found, it is only another evidence of the profound way in which character absorbed the playwright's mind, even to the occasional neglect of other matters.

Other great books, such as the English Bible and the 'Essays' of Montaigne, have been shown to have strongly affected Shakespeare's thought and phrase. However «unlearned» he was, books played a large part in his education.

Mind and Opinions.—His mind and opinions are not so inscrutable as the 19th century supposed them. When Matthew Arnold wrote

> Others abide our question. Thou art free.
> We ask and ask: Thou smilest and art still,
> Out-topping knowledge

he was summing up a romantic point of view. But modern investigation and a somewhat more skeptical approach have yielded a credible picture of the man Shakespeare, however elusive the explanation of his genius remains. «He was not of an age, but for all time» wrote Jonson of him, and the statement is true in more than one sense. Shakespeare shows remarkably little interest in purely contemporary aspects of his age. It is surprising to find in all his works no reference to the water-men who plied their boats for hire across the Thames and were a common and colorful feature of everyday London life, especially to one whose place of business was on the Surrey side. And it is even more curious that he never mentions tobacco.

The plays have been combed for references to contemporary events and persons, with meager results. There is a reference to Queen Elizabeth in 'Midsummer Night's Dream,' but Shakespeare does not comment on her death in 1603. There is a reference to Essex in one of the choruses of 'Henry V,' but it expresses a hope which was sadly disappointed. A passage in 'The Merry Wives' glances at some farcical difficulties of Frederick, Count Mömpelgart, in securing horses when he was on a visit to England. Macbeth includes a prophesy intended to flatter King James. There may be other topical references not now recognizable, but even so, Shakespeare, in comparison with his fellows, is remarkably indifferent to the news of the day. Perhaps he shared the disdain of his Rosencrantz, who told how the boys' companies acted topical plays to score a cheap success: «There is, sir, an aery of children, little eyases, that cry out on the top of question, and are most tyranically clapped for 't.»

The poet's sensitiveness was touched, rather, by the Warwickshire countryside, the environment of his youth; its native flowers and trees, the field sports, country people, and animals are always vividly evoked. His fairy lore is that of his native county, and he carries with him, to Belmont in Italy where Lorenzo and Jessica are wooing, to the woods near Athens where Theseus is celebrating his wedding, to the glassy stream in Denmark where Ophelia drowned—the five senses of an English country boy. Milton described him as «Fancy's child, warbling his *native wood-notes* wild.»

Even his political sympathies are conservative; he is most eloquent in praise of degree

and rank ('Troilus and Cressida,' I, iii, 75–137); of the divinity of kingship ('Richard II'); of feudal loyalty and devotion ('Henry V'); and of «little England,» not the great empire envisioned by a Raleigh or a Drake ('Richard II,' II, i, 40–50). He shows constant fondness for the tillers of the soil and distaste for the workmen of the city, whom Dekker and Heywood glorified. In Tucker Brooke's phrase, the penumbra of his mind was archaic.

Recent investigation of Shakespeare's imagery has shown some interesting associations in that part of his mind below the level of consciousness. Sometimes a group of images will dominate a play, giving an emotional aura to it which denies the stark objectivity often attributed to the dramatist. In 'Hamlet' for example the dominant images relate to disease, and in 'Troilus and Cressida' to cooking and food. Persistent themes like fire, music, storms, animals weave themselves through the tragedies, and although the predominance of one of these over the others in any given play may be open to different interpretations, this approach will probably lead to results which distinguish Shakespeare as an individual more sharply than ever before.

Sonnets and Lyrics.—Shakespeare was as much a poet as a playwright. Fortunately, the existence of a poetic drama which, after Marlowe, was capable of the greatest expression poetically and dramatically made it unnecessary for Shakespeare to continue the career as a nondramatic poet which he had begun with 'Venus and Adonis' and 'Lucrece.' The exception to this is his series of sonnets published in 1609. (See SHAKESPEARE'S SONNETS.)

In 1599 a small anthology called 'The Passionate Pilgrim' was issued by the publisher William Jaggard with the name of Shakespeare on the title page. Among the 20 poems are two sonnets by him and three excerpts from 'Love's Labour's Lost,' but some of the other poems are known to be by other men and possibly all of them are. When the book reached a third edition in 1612, several selections from Heywood's 'Troia Britanica' were added, and Heywood protested at the piracy, with the remark that Shakespeare was also vexed. This led to the issuance of a new title page without an author's name. In 1601 a genuine poem by Shakespeare, now always called 'The Phoenix and the Turtle,' appeared in Robert Chester's 'Love's Martyr,' a collection of poems celebrating the love of Sir John Salusbury and his wife. Shakespeare's poem is a «metaphysical» one, in quatrains, and it has met with both strong condemnation and strong praise. Appended to the edition of the sonnets in 1609 was a poem called 'The Lover's Complaint'; modern critics doubt, on internal evidence, that it is by Shakespeare.

Not these miscellanea, but the songs and other lyrical passages in the plays, and the sonnets, give Shakespeare the very highest rank as a lyric poet. When he wrote for music, his style became clear and limpid, however tortured and complex the play might be. The songs are commonly filled with pleasant details of nature, very English, but they never become prosy or pedestrian. They show the gaiety of the contemporary ballet or dancing song, the gravity of the motet, and the occasional epigrammatic quality of the madrigal. All of these part songs had reached the height of their development in the poet's lifetime, and the modern song with accompaniment, the «air,» was just coming in. Two of Shakespeare's songs can still be sung to contemporary musical settings; they are «It was a lover and his lass,» set by Thomas Morley in his 'First Book of Airs' (1600), and «O Mistress Mine,» set by Morley in his 'Consort Lessons' (1599), and by William Byrd with elaborate variations for the virginals. The songs at the end of 'Love's Labour's Lost' beginning «When daisies pied and violets blue» and «When icicles hang by the wall» have been called by Masefield the loveliest thing ever said about England. But most important of all, the songs always have a dramatic purpose and a dramatic effectiveness; the poet never releases his lyricism wantonly or idly.

Rhetoric.—Like all Elizabethans, Shakespeare was fond of conceits, tricks with words and ideas, puns. Dr. Johnson's statement of it is famous: «A quibble was to him the fatal Cleopatra for which he lost the world and was content to lose it.» But Keats saw that the working out of conceits produced in the poet a kind of intensity which threw out many fine things, as if said unintentionally. And in Shakespeare's mature style, what was once extraneous decoration, suited to the taste of readers of Lyly, has become metaphor of the richest sort, and metaphor is of the essence of poetry. No description of Shakespeare's achievement as a poet could better his own, when he added to his passage on the lover and madman as imagiiners, a characterization of the poet:

> The poet's eye, in a fine frenzy rolling,
> Doth glance from heaven to earth, from earth to heaven;
> And, as imagination bodies forth
> The form of things unknown, the poet's pen
> Turns them to shapes, and gives to airy nothing
> A local habitation and a name.

The Elizabethan Stage.—No emphasis on Shakespeare as a poet should carry with it the implication that he was not at home in the theater. His solution of problems which confronted him as a playwright is as great as his success in making poetry. The Elizabethan stage was more plastic than ours; spectators surrounded it on three sides, and the scenic effects, lighting, and framing of our stage by the proscenium arch were all lacking. An outer stage stuck out into the pit, and behind it was a small inner stage, across which a curtain could be drawn. Above the inner stage was a balcony or upper stage. Properties were used, but if they were on the outer stage, no curtain could be used to conceal their removal. The audiences were not provided with programs listing the time and place of each scene, and the notation of time and place in modern editions of the plays is the anachronistic contribution of modern editors. Shakespeare was working, then, within a very different set of conventions from those we are accustomed to in the theater. He indicated the location of a scene only if it was important for the audience to know, and then he had to do it in the lines. The inner stage could be a cave, a study, or a bedroom; it could be all three in succession. The upper stage could be the top of a town wall or Juliet's balcony; the outer stage could be a street or a forest or a throne room. Because there was no scene shifting and because many scenes were unlocalized, the pace of the play

could be very rapid. And this generalization of location made a difficulty for the dramatist in the indication of dramatic time. Shakespeare, as we might expect, made of difficulty an opportunity, so that in 'Othello,' for example, he is able to have two time schemes, contradictory but not noticeably so to the spectator, each of which has its subtle effect upon the feeling and tension of the drama.

The closeness of the audience to the actors made the soliloquy and the aside seem much less artificial than they seem on the less intimate modern stage, and these conventional devices are also means of achieving swiftness and directness, since conveying the same information by dialogue, however «natural» it might seem, would take much longer. But Shakespeare did not rest content with the soliloquy as an economical device: witness 'Hamlet.'

The makeup of an Elizabethan repertory company was another source of limitations and opportunities for the playwright. Actors naturally specialize somewhat in such a company, and their individual peculiarities must be allowed for. Happily, in Richard Burbage, the Chamberlain-King's men had an actor of great versatility and talent for the leading roles, and in Kemp and Armin, Shakespeare seems to have had two extraordinarily good clowns. The most peculiar aspect of the company to modern eyes was the necessity of using boys to play female parts. How could a heroine of any greatness be adequately portrayed by a boy? Shakespeare seized enthusiastically upon the romance device of a girl disguising herself as a boy, and in the comedies where the heroine is most important, Rosalind and Viola project their charm in disguise. Furthermore, his heroines derive their attractiveness not from physical charm, but from wit and modesty, gaiety and purity. Even Cleopatra, the serpent of old Nile, conquers Antony by keen insight, sensitive and brilliant dexterity of mind and temper, rather than by elementary physical appeal.

There is little protest in Shakespeare at the limitations of his medium. Once, in a chorus of 'Henry V,' he asks how «this wooden O,» the Globe Theater, «this unworthy scaffold,» can represent the vast fields of France where Harfleur and Agincourt were won. And Cleopatra imagines «some squeaking Cleopatra boy my greatness» in Caesar's triumph, but this is rather a fear of parody than of representation. In 'As You Like It,' 'Macbeth,' and 'The Tempest' he uses the old idea of the world itself as a bare stage, with the actions of men and women merely the plot of a play, and he apparently felt that it was as futile to complain of the limitations of the theater as it would be to complain of the limitations of life itself.

Last Years, 1613–1616.—Shakespeare retired from active service as the leading playwright of the King's men sometime in 1612 or 1613, leaving his position to the younger John Fletcher, with whom he collaborated in 'Henry VIII' and 'The Two Noble Kinsmen.' The last years of his life have interested his imaginative biographers almost as much as the lost years of his youth, and the picture given usually tells more about the biographer than about the subject. The first biographer, Rowe, said: «The latter part of his life was spent, as all men of good sense will wish theirs may be, in ease, retirement and the conversation of friends.» Sir Sidney Lee and Lytton Strachey fill in other details from fancy. But if we turn to the Stratford records again, we find only that his brother Richard was buried 4 Feb. 1613; he was given £5 in the will of John Combe, a wealthy Stratford moneylender, in 1614; he protected his investment in the tithes against possible harm from the enclosures of Combe; his daughter Judith married the son of his old friend Richard Quyney in February 1616; and he drew up his own will in March 1616 and died on 23 April of that year.

The Will.—The will is extant, and each of its three pages bears Shakespeare's signature. He left £300 to his daughter Judith, part of it as a marriage portion, £20 to his sister Joan and £5 to each of her three sons, £10 to the poor of Stratford, small remembrances to a few friends, his second-best bed to his wife, and the residuary estate to his daughter Susanna, who lived with the Shakespeares at New Place. Presumably Susanna was to see that her mother was taken care of. It is apparent that Shakespeare wished to found a family of landed gentry, for he provides that the estate shall go to the male issue of his daughter Judith if Susanna and her daughter Elizabeth both fail to have a son. Susanna was the wife of Dr. John Hall, a prominent physician who left some manuscript case books, later translated and published, which mention illnesses of his wife, his daughter and himself, but none of his father-in-law. The Halls had no son, and their daughter Elizabeth married first Thomas Nash and later Sir John Bernard, but died childless in 1670, the last direct descendant of the poet.

Shakespeare was buried 25 April 1616. On his gravestone are four lines of doggerel verse:

> Good friend, for Jesus' sake forbear
> To dig the dust enclosed here!
> Blest be the man that spares these stones
> And curst be he that moves my bones.

Seventeenth-century legend says that Shakespeare wrote these lines himself and that the curse effectively prevented opening of the grave, «though his wife and daughter did earnestly desire to be laid in the same grave with him.»

Portraits.—The only two portraits of Shakespeare which have any authority are the bust on his monument in the Stratford church, done by Gheerart Janssen sometime before 1623, and the engraving by Martin Droeshout which serves as a frontispiece to the First Folio. It is not known whether either Janssen or Droeshout had ever seen their subject, but the latter was only 15 when Shakespeare died. Neither portrait can be called a work of art, but presumably the bust was enough of a likeness to satisfy the family. The various paintings, some contemporary with him, which are claimed to be of Shakespeare, serve the purpose of pacifying those who are revolted by the stolid expression of the bust and the engraving. But the safest thing to do is to follow the advice of Ben Jonson and «look not on his picture, but his book.»

Posthumous Reputation.—Shakespeare did not succeed in founding a family; neither was he the founder of a literary school of followers, as Spenser and Jonson were. There is ample evidence from the allusions to him even before 1600 that he was a popular writer, both as poet and as playwright. Jonson, the greatest critic of the age and a man opposed on principle to much

in Shakespeare's kind of art, did him full justice. The references to him between 1590 and 1700 collected in 'The Shakespeare Allusion Book' fill two large volumes, and others have been found since.

In general, his reputation has remained high in succeeding ages. The Restoration period sometimes preferred Jonson for correctness and Beaumont and Fletcher for «the language of gentlemen,» but Shakespeare was popular on the stage and Dryden praised him highly and discriminatingly. In the 18th century a kind of Shakespeare idolatry set in which lasted well into the 19th. This served in part as an attack upon the rigid canons of neoclassic taste and an aid to the growing Romantic Movement, but it should be remembered that Dr. Johnson, certainly no romantic, defended Shakespeare for violating the unities, even if he did regret that poetic justice was not always employed in the conclusions of the plays. The reaction against the idolatry has not lessened his fame or station among the world's great, and it has carried with it a tremendous amount of scholarly study, to which Americans and Germans have contributed as much as Englishmen—study which has thrown revealing light on the theater, the companies, the texts, and the man himself.

Theatrical History.—The greatest actors of the English-speaking stage have uniformly attempted the major Shakespearian roles, and the plays have served for 300 years as the greatest test and greatest opportunity for actor, producer, and designer. After Burbage the next actor of first rank is Thomas Betterton (q.v.). His devotion to Shakespeare led him to make a pilgrimage to Stratford and collect data which he gave to Rowe, the first biographer. He was famous as Hotspur, Brutus, Othello, Macbeth, and Lear; he played Hamlet with great success until he was over seventy. Many of the versions he used were «improved» for Restoration taste, but in his own acting versions he refused to paraphrase the poet.

In the mid-18th century David Garrick (q.v.) dominated the stage, and he served Shakespeare as actor, producer, and adapter. He failed in the parts of Othello and Iago, but his Lear and Hamlet were great successes, and his comic talent was shown in his Benedick.

Garrick's successor in the great tradition was John Philip Kemble (q.v.) who was active from 1788 to 1817. He played most of the tragic heroes with success, but other members of his brilliant family equalled him. His sister Sarah, Mrs. Siddons (q.v.), was the greatest of Lady Macbeths, and his niece Fanny won great fame for her Juliet. Kemble as manager revived some minor Shakespearian plays which had been long off the stage.

Edmund Kean (q.v.) exemplified romantic interpretation at its height; he appeared first at Drury Lane on 26 Jan. 1814, and for the younger generation he immediately supplanted Kemble. Praise of him by Leigh Hunt, Hazlitt, and Lamb has become literature. He was especially famous for Shylock, his first role, Othello and Richard III.

W. C. Macready in the 1830's tried to keep alive the old system of large patent theaters but failed. Two of his actors were great: Helen Faucit, the finest actress of the romantic heroines, and Samuel Phelps, who, after being held back by Macready, came into his own with the failure of the big theaters and the repeal of the Licensing Act in 1843. At Sadler's Wells he presented Shakespeare for 30 years; he revived all but seven of the plays and he scorned «improved» texts.

From 1850 to 1879 Charles Kean at the Princess's Theater started the elaborate, scholarly, and heavy productions which continued through the age of Henry Irving and Beerbohm Tree. This smothering of the play by the production was stopped in the 20th century by the influence of Gordon Craig and Granville-Barker.

The 'Old Vic' in London still keeps the tradition alive, and actresses from Ellen Terry to Helen Hayes, actors from Irving to John Barrymore, John Gielgud and Maurice Evans have used the plays of Shakespeare for their greatest achievements. See also SHAKESPEARE, AUTHORSHIP OF.

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SHAKESPEARE, Authorship of. The question of the authorship of the plays now or formerly published under Shakespeare's name has turned in several directions and has had many ramifications. The first of these is the apocrypha, plays ascribed to Shakespeare in his lifetime or later but not now included in the canon. The second is the question of whether

William Shakespeare of Stratford was actually the author of the plays of the canon, or if his name has merely been put to plays which are the work of another man. The third is the question of whether the plays in the canon are collaborations, or plays by other men slightly revised by Shakespeare, or plays drafted by Shakespeare and finished by other writers.

Apocrypha.—The canon begins with 36 plays included in the First Folio, 1623. Two other plays are usually now added, 'Pericles' and 'The Two Noble Kinsmen,' although it is not contended that Shakespeare is the sole author of these. Many scholars would add a part of 'Sir Thomas More.'

During Shakespeare's life four other plays were attributed to him on the title page of an edition. 'The First Part of Sir John Oldcastle' appeared in 1600 in two editions, one of which bore the words «written by William Shakespeare,» the other anonymous. The editors of the Third Folio (1664) and the Fourth Folio (1685) reprinted the spurious quarto. The actual authorship is revealed in the diary of Philip Henslowe, manager of the rival company to Shakespeare's. Munday, Drayton, Wilson, and Hathway collaborated on this drama as an answer to the popular Falstaff plays of the Chamberlain's men. (Shakespeare's Falstaff was originally named Oldcastle.) Two other plays bore Shakespeare's name while he was still alive: they are 'The London Prodigal' (1605) and 'A Yorkshire Tragedy' (1608). Today, they are both universally rejected as his, because the former is a comedy of humours and manners, the latter a tabloid play about a contemporary murder. Shakespeare is not known to have done anything like either of these, and they bear no traces of his style. Three plays before 1616 carried the initials W. S., and one of them 'Thomas, Lord Cromwell,' was also said to have been acted by the company to which Shakespeare belonged. The 1611 edition of 'The Troublesome Reign of King John' (not the 'King John' in the Folio) was attributed to 'W. Sh.' These attributions carry no authority at all. Other attributions were made in the 17th century, by booksellers and others, of plays ranging from the most popular of all Elizabethan trashy plays, 'Mucedorus,' to the fine history play 'Edward III,' possibly by Peele, and the best of the plays about contemporary murders, 'Arden of Feversham.' The Shakespeare Apocrypha have been collected and edited by Tucker Brooke (Oxford 1908).

Baconian Theory.—During the 19th century much excited controversy was stirred up by the thesis that Shakespeare's plays were written by Francis Bacon. This unproved theory had its root in the idea that Shakespeare could not have had the education or the background of experience to write the plays, while Bacon's great intellectual faculties were equal to the task. An American woman, Delia Bacon, was the first important proponent of the idea. She was encouraged temporarily by Emerson, Carlyle, and Hawthorne, went to England to secure «proof,» published 'The Philosophy of the Plays of Shakespeare Unfolded' in 1857, and soon after became obviously insane. The next important contribution to the theory came from the Minnesota politician, reformer and popular orator, Ignatius Donnelly. He worked out, in 'The Great Cryptogram' (1888), a cipher by which the Baconian authorship could be demonstrated. All restraints on the imagination of Baconians were removed by this device, and soon investigators like Mrs. E. W. Gallup ('Francis Bacon's Bi-Literal Cypher,' 1899) were revealing that Bacon wrote not only Shakespeare but also Marlowe, Jonson, Peele, Greene, Spenser, and Burton's 'Anatomy of Melancholy.' Bacon was, it seems, the son of Queen Elizabeth and Leicester, rightful Prince of Wales, and he wrote literature in order to complain of his lot, in cipher, to future researchers. All of these ciphers which tell anything can be made to tell too much; that is, they work equally well on books published long after Bacon's death. No adherent of the Baconian school was a trained and professional literary scholar, but the heresy had a wide appeal to amateurs. The devotees explained the absence of converts among trained scholars to prejudice, and the ridicule to which their efforts were subjected had little effect. Many Baconians lectured persuasively and brilliantly, even though their writings are ponderous and dull.

Since about 1910 the Baconian heresy has declined, and its place has been taken by the theory that some other lord was the real author of the plays. Perhaps the leading candidate at present is Edward de Vere, 17th Earl of Oxford, whose contemporary reputation as a writer is now supported only by a few lyrics. His claim to the plays of Shakespeare was first put forward by J. Thomas Looney in 1920, and it has been supported by Captain B. M. Ward's biography, 'The 17th Earl of Oxford' (1928), several works by Percy Allen, George Frisbee's 'Edward de Vere' (1932), and M. W. Douglas' 'Lord Oxford was Shakespeare' (1935). But the glittering and Italianate Oxford does not hold the field alone; he has rivals in several other prominent Englishmen. In 1919 Professor Abel Lefranc of the Collège de France devoted two volumes called 'Sous le masque de Shakespeare' to the cause of proving that William Stanley, 6th Earl of Derby, wrote the plays. Another French writer, C. Demblon, had already, in 1912, advocated Roger Manners, 5th Earl of Rutland. Peter Alvor, the German, has been fickle in his heresy, favoring a collaboration of Southampton and Rutland in 1907, Anthony Bacon in 1911, and Charles Blount, 8th Lord Mountjoy and Earl of Devonshire, in 1930. Sir Walter Raleigh was nominated for the honor in 1914 by Henry Pemberton, Jr. In a sense, these various theories cancel each other, and there would seem to be no reason why the list of true authors of Shakespeare could not be expanded further, since there were other courtiers and aristocrats of the time who could write. All this is of interest principally to show how the Baconian skyrocket explodes in a shower of sparks before the dead stick finally falls to earth.

Disintegration.—The attack on the integrity of the canon begins with F. G. Fleay, ('Shakespeare Manual,' 1876, and 'Life and Work of Shakespeare,' 1886), who proceeded from the idea that Shakespeare's plays in the old texts show signs of extensive revision to the conclusion that the matter being revised was not by Shakespeare but by a predecessor. The plays in the canon were thus seen as pieces of patchwork, part original Shakespeare, part Shakespeare revision, part unretouched frag-

ments of Marlowe, Greene, Peele, Lodge, and many others. This approach has been represented more recently by J. M. Robertson ('The Shakespeare Canon,' 1922, 'State of Shakespeare Study,' 1931, and 'Literary Detection,' 1931). His method is to judge first from subjective impressions, a feeling that a particular passage does not sound like Shakespeare; then he applies metrical tests, which have been devised to settle the problem of the chronology of Shakespeare's plays, and finally he searches for clues—words, figures or expressions which are not common in Shakespeare but are common in some other author. Underlying it all is the conviction that Shakespeare, being a great writer, could never write anything that was hasty, or stiff, or awkward or bombastic. Most of what he finds non-Shakespearian he attributes to Chapman or to Marlowe. There is no external evidence whatever to support the conclusions. In order to believe them one must believe that the Folio editors, Hemings and Condell, either did not know or chose to conceal the fact that they were publishing under the name of their fellow Shakespeare some plays on which he did only a slight amount of retouching and revising. And the methods Robertson used are dubious even as internal evidence. Percentage figures of feminine endings and of rhyme in the verse may prove something if a whole play is being considered, but these figures lose their significance when they are applied to a single scene or short passage. Furthermore, no clear-cut assignment of vocabulary, tricks of style, and mannerisms has ever been made among all the Elizabethan dramatists and poets. For these reasons the disintegrators have not convinced the great majority of Shakespearian scholars, who seem willing to believe that Shakespeare, like Homer, occasionally nods, and that without being superstitious about it we can safely accept the contents of the First Folio as the work of William Shakespeare of Stratford, gentleman. The best reply to the disintegrators is the lecture by Sir E. K. Chambers before the British Academy in 1924 called 'The Disintegration of Shakespeare.' See also SHAKESPEARE, WILLIAM.

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SHAKESPEARE SOCIETIES. The first Shakespeare society was founded in 1841, in London, and before its dissolution in 1853, had published 48 volumes. A new English Shakespeare society was organized in 1874, and the German Shakespeare Society was founded at Weimar in 1864. In the United States the Shakespeare Society of New York was organized in 1885. The latter has published the 'Bankside Shakespeare' (20 vols., 1888–92) and 'The Bankside Restoration Shakespeare' (1907). The Shakespeare Association was founded in London in 1914 and the late Israel Gollancz was chosen first president. The newly founded Shakespeare Association of America has through its annual dinners and its plans for Shakespeare centres in America done much to keep public interest alive.

SHAKESPEARE'S SONNETS. The Sonnets of Shakespeare were published in 1609, in a small quarto volume which is generally thought to have been «piratical,» that is, to have been issued without the author's consent. The circulation of poems in manuscript form was a common matter in the Elizabethan age, and there is direct evidence that it had been taking place in the case of these sonnets; for Francis Meres, in a little work called 'Palladis Tamia,' published 1598, observed: «As the soul of Euphorbus was thought to live in Pythagoras, so the sweet witty soul of Ovid lives in mellifluous and honey-tongued Shakespeare, witness his 'Venus and Adonis,' his 'Lucrece,' and his sugared Sonnets among his private friends.» In the following year, 1599, two of the sonnets were published in the piratical compilation called 'The Passionate Pilgrim.' For these and other reasons it is assumed that a good part of Shakespeare's Sonnets had been written a considerable time before the publication of the volume of 1609; but as to the period of his life most likely to be represented by them, there is no general agreement. Some critics regard them as early compositions, largely completed by 1594–96; others as having been written largely in the period 1598–1603; while still others assume, in the absence of definite evidence, that they may have been produced at intervals throughout Shakespeare's literary life. It is agreed, however, that few are to be attributed to his later period, that is, after 1603.

The Sonnets are 154 in number, and are written in the form sometimes called «English» to distinguish it from the more orthodox «Italian» sonnet form; that is, each of them is divided into four quatrains and a final couplet, by the rhyme-scheme *abab, cdcd, efef, gg.* This form had already been used successfully by Samuel Daniel in a popular collection of sonnets, and it is to his influence that the general form and style of Shakespeare's are most commonly traced; though it is also likely that he had studied the sonnets of Sir Philip Sidney, by far the finest sonneteer of the early Elizabethan age, and perhaps those of Michael Drayton as well. How far Shakespeare was acquainted with the work of Italian and French sonneteers we have no means of knowing. None of his sonnets appears to be a translation or direct imitation of a particular source; on the other hand, the themes and rhetorical methods of the continental poets abound in his sonnets, as in those of his English contemporaries, and there is no reason to doubt that he was familiar with the general character and course of the sonnet-writing fashion, which came into England from Italy and France, and reached its height there about 1594–96. A great part of these Renaissance sonnets were issued in the form of «sequences,» that is, collections centred around a single theme,— usually a woman (real or ideal) beloved by the poet,— and capable of being read either as single poems or as a connected account of the poet's subjective experiences. In the case of Shakespeare's Sonnets, it is disputed whether they are to be regarded as forming a sequence or not. They have no title or otherwise clearly defined theme; and we cannot say whether they were printed from a single manuscript or from scattered collections, nor whether the order in which they stand in the quarto of 1609 is that in which they were written or that in which they would have been published if Shakespeare

had prepared them for the press. Hence the only evidence as to the unity of the series is internal; and many critics find themselves able to read it as a connected story, while to others it seems to be a mere miscellany, though containing many pairs, trios, and perhaps larger groups of sonnets intended to be read connectedly. The weight of opinion may be said to be that there is a certain unity in the collection, suggestive of the view that the great part of the sonnets have to do with the same persons and events, but that there is no complete continuity such as would result from an authoritative arrangement either for narrative or lyrical ends. As a result of this uncertainty regarding the arrangement of the Sonnets, they have been rearranged by many editors and critics, in accordance with individual theories. Perhaps the most plausible and useful of these rearrangements is that of C. M. Walsh, in his edition of 1908; this is based not on any constructive theory, but on the effort to group the sonnets according to internal evidence as to content and style, and therefore errs — if at all — in the direction of an unnecessary breaking up of possible sequences.

The opening sonnets, as they stand in the volume of 1609, are addressed to a young man, apparently of good family and striking personal charms and gifts, who is urged by the poet to marry in order that he may beget children to perpetuate his qualities and so, in a sense, overcome the ravages of time and death. Many of the following sonnets apparently either refer to or are addressed to the same young gentleman, and it is *possible* to read every one of them, up to and including the 126th, as having reference to this person,— though many of the number, if standing by themselves, would be assumed to be addressed to beautiful women. For this reason Sonnets 1–126 are frequently called the First Series, and it is assumed that they came into the publisher's hands as a body. Moreover, the sonnets from 127 to 152 inclusive have chiefly to do with a woman, dark of complexion and dark of character, and all of these *can* be read as concerned with this theme; hence this group is frequently called the Second Series. (Sonnets 153 and 154 admittedly stand quite by themselves as mere literary exercises.) A link between the two series is found in the fact that Sonnets 40–42 on the one hand, and 133–136 on the other, appear to refer to the same event, namely, an intrigue between the beautiful young man and the dark woman, in which it would seem that both proved untrue to their poet friend. Sonnet 144 may be viewed as the more definite key to this triangle; it is the famous poem in which the writer speaks of having «two loves»:

> " The better angel is a man right fair,
> The worser spirit a woman colour'd ill."

Obviously, this group of sonnets raises with peculiar interest the question which attaches in some form to most of the sonnet sequences, — how far the writer speaks literally of himself, that is autobiographically, how far conventionally or imaginatively. Students of Shakespeare's Sonnets have differed widely, sometimes bitterly, on this question, and all possible answers to it may be found, ranging from the extreme view that the story is a wholly imaginative one, with no more reference to Shakespeare's personal life than that of Romeo or Othello, to the opposite extreme, that we have in his sonnets a perfectly clear and definite record of his friendship for an attractive but faithless young man and a repulsive yet strangely fascinating woman. The interpreters of the latter sort have also made strenuous efforts to identify the persons concerned; a number of them, in particular, having determined that the young man friend is Henry Wriothesley, Earl of Southampton, others being equally certain that he is William Herbert, Earl of Pembroke. The dispute is complicated by the curious circumstance that the publisher of the sonnets dedicated them to a «Mr. W.H.,» whom he called their «only begetter,» and it has been assumed that this should give a clue to the person addressed in the First Series. All these matters are still in debate, and there is no reason to expect any unquestioned solution. In general, modern criticism tends to agree on the view that a good part of these sonnets, including those concerned with the intrigue with the dark woman, were of definite personal significance (chiefly because, if Shakespeare had set out to tell an imaginative tale, he would have done it better and more clearly than he has told this one), but at the same time that they represent conventional moods and manners familiar to Shakespeare's contemporaries, and are therefore not to be taken so seriously by students of his life as many have done. It is certain that none of the attempted identifications has been proved.

The disputes concerning the arrangement and the biographic significance of the Sonnets have tended to obscure the question of their poetic qualities. In general, here as with Renaissance poetry as a whole, it is necessary to distinguish between qualities peculiar to that age and those of permanently vital character. Chief among the former group is Shakespeare's use of the «conceit,»—that is, the ingenious elaboration of a verbal or imaginative figure,— a habit common to most of the Renaissance lyrists, and consonant with Shakespeare's taste, especially in his more immature periods. Notable examples of this are to be found in Sonnets 8, 24, 43, 46–47, 99, 132, 135–136 and 145. As a lyrical method this is of course opposed to the canons of modern taste, and in the 18th century, when criticism was disposed to deal with special severity with Renaissance ingenuities, the poems of Shakespeare suffered a corresponding depreciation; Steevens, one of the leading editors of the plays, refused to admit them to his edition of the Works of Shakespeare, saying that no act of Parliament would compel readers for the Sonnets. On the other hand, it is now universally admitted that in many of these sonnets we have unsurpassed examples of the power of lyrical poetry to express personal feeling in concentrated form. In particular, they deal with the theme of the struggle of human love and beauty against the arch-enemies Time and Death — now representing these enemies as triumphant, now finding in poetry a means of overcoming them, but chiefly finding such a means in the unconquerable power of love.

From this standpoint Sonnet 116 may be viewed as the climax of the collection:

> "Love alters not with his brief hours and weeks,
> But bears it out even to the edge of doom."

Other sonnets of importance for their content or lyrical beauty are 18, 29, 30, 31, 52, 55, 60 64, 71, 73, 74, 90, 97, 102, 106, 129, 146.

The most comprehensive edition is the variorum edited by R. M. Alden (1916); it contains very full notes, critical apparatus, and a history of the criticism of the sonnets. The second revised (English) Arden edition, by C. K. Pooler (1931), should also be mentioned. J. A. Fort's 'A Time Scheme for Shakespeare's Sonnets' (1929) is now generally accepted on matters of date. Janet Scott's 'Les sonnets élisabéthains' (1929) should be read with Sidney Lee's 'Life of Shakespeare' on the sources. The best rearrangement of the sonnets, and probably the best introduction to them, may be found in the edition of Professor Tucker Brooke (1936).

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SHAKTAS. See RELIGIOUS SECTS.

SHALE, a sedimentary rock made up largely of compacted clay with admixture of other finely ground rock material, and splitting into thin layers parallel to the bedding plane. In the typical shales the rock splits with a conchoidal or shelly fracture, the surface being marked by wide shallow depressions rather than by absolute smoothness. In composition, shales may be purely argillaceous, but they are generally more or less silicious, calcareous, ferruginous or carbonaceous, according to the material admixed with the clay. The carbonaceous shales are often used for the manufacture of oil or gas, some of them being so rich in carbon as to burn with a bright flame. These are called oil shales, or kerosene shales. Alum shales are clay shales rich in iron pyrites which on decomposing permits the formation of sulphuric acid, which in turn reacts upon the clay shale with the formation of alum. Calcareous shales are largely used in the manufacture of Portland cement.

SHALER, shā'lėr, **Alexander,** American soldier: b. Haddam, Conn., 19 March 1827; d. 1911. He was educated in private schools and graduated from Brainard Academy in 1844. In 1845 he joined the Washington Grays (later known as Eighth regiment New York State militia) and transferred to the Seventh regiment in 1848, becoming major of that regiment in 1860. He was commissioned lieutenant-colonel of the 65th New York Volunteers on the outbreak of the Civil War, and became colonel in 1862, commanding the military prison at Johnson's Island, Ohio, during the winter of 1863–64. He served with the Army of the Potomac, participating in all its battles, until 6 May 1864, when he was taken prisoner at the battle of the Wilderness, and was held in Charleston, S. C., during the summer of that year. After his exchange he commanded a division in the Seventh corps and the post of Duval's Bluffs, Ark., serving in the Southwest until he was mustered out 24 Aug. 1865. He was commissioned brigadier-general of volunteers in 1863, and brevetted major-general of volunteers in 1865. From 1867 until 1870 he was president of the board of commissioners of the Metropolitan fire department, and commissioner of the fire department of New York 1870–73. He was consulting engineer to the Chicago board of police and fire 1874–75, being charged with the reorganization and instruction of the fire department of that city. From 1867 till 1886 he was major-general of the first division of the National Guard of the State of New York, and was an organizer and president of the National Rifle Association of the United States. While a member of the board for the purchase of sites for armories he was accused of bribery, but although he was tried twice the jury disagreed each time. General Shaler published a 'Manual of Arms for Light Infantry Using the Rifle Musket' (New York 1861).

SHALER, Nathaniel Southgate, American geologist: b. Newport, Ky., 20 Feb. 1841; d. Cambridge, Mass., 10 April 1906. He was graduated from the Lawrence Scientific School, Harvard, in 1862, served in the Union army as an artillery officer, and then returned to the Lawrence School, where he was assistant and instructor in geology and zoology He accepted the chair of palæontology at Harvard in 1868, was transferred in 1887 to that of geology, and he was dean of the Lawrence School from 1891. In 1873–80 he was in charge of the Kentucky geological survey, and from 1884 was director of the Atlantic division of the United States geological survey. He was commissioner of agriculture for the State of Massachusetts at different times, was president of the Geological Society of America in 1895; and besides numerous reports for the United States geological survey published 'Kentucky Geological Reports and Memoirs' (7 vols., 1876–82); 'The Story of Our Continent' (1892); 'The Interpretation of Nature' (1893); 'The United States of America' (2 vols., 1894); 'The Individual: Study of Life and Death' (1900); 'The Citizen: A Study of the Individual and the Government' (1904); 'The Neighbor' (1904); 'Man and the Earth' (1905). Consult 'The Autobiography of Nathaniel Southgate Shaler,' with a memoir by his wife (New York 1909), etc.

SHALLOON, a light woolen textile said to derive its name from Châlons in France, where it was originally manufactured.

SHALLOP, a light fishing-vessel with two masts and carrying lug or fore-and-aft sails; also a small boat for one or two oarsmen.

SHALLOT, or **ESCHALLOT,** a perennial bulbous plant (*Allium ascalonicum*) of the order *Liliaceæ*. The bulbs are seldom two inches long and an inch in diameter. They send up hollow small leaves which are often used for mixing with salads and dressings, or are eaten alone. The bulbs are also similarly used. They are planted in early spring in rich soil about four inches apart, in rows 15 to 18 inches apart, and kept cleanly cultivated throughout the season. The leaves may be cut at any time and the bulbs taken up in autumn, dried like onions or garlic, and kept in a dry, cool place. From two to six bulbs are usually produced by each bulb planted. In the South they are generally planted in the autumn and even in the North they may be left in the

ground over winter. They are less grown in the United States than in Europe.

SHALMANESER, shăl-mą-nē'zẽr, second of his name, the Assyrian king, who in 853 B.C. defeated Benhadad with his ally, Ahab, king of Israel, at Karkar, the Biblical Kirharaseth (2 Kings iii, 25), on the Orontes. Shalmaneser did not gain a decisive victory over his foes, as he was unable to proceed to Damascus and to wage war against his other enemies; he was worsted in battle by the Chaldeans of Armenia. See AHAB; ASSYRIA.

SHAMANISM, a vague term used by explorers of Siberia in the 18th and 19th centuries to designate not a specific religion but a form of savage magic or science, by which physical nature was believed to be brought under the control of man. It prevails among Turanian and Mongolian tribes and American Indians, and blends with their varied religious beliefs and customs. Shamanism rests for its basis on the animistic view of nature. Animism teaches that primitive and savage man views the world as pervaded by spiritual forces. Fairies, goblins, ghosts and demons hover about him waking or sleeping; they are the cause of his mishaps, losses, pains. Mountains, woods, forests, rivers, lakes are conceived to possess spirits, and to be living, thinking, willing, passionful beings like himself. In respect to these, man is in a state of helplessness. The shaman by appropriate words and acts uses his power to shield man and envelops him in a kind of protective armor so that the evil spirits become inactive or inoffensive. His rôle is that of antagonist to the spirits and of guardian to ordinary man. The Eskimos believe all the affairs of life are under the control of malignant spirits who are everywhere. These minor spirits are subject to the great spirit Tung-Ak, yet must be propitiated. The shaman alone is supposed to be able to deal with the great spirit, though not superior to him. The main principle of Shamanism is the attempt to control physical nature. Hence the term embraces the various methods by which the spirits can be brought near or driven away. The belief that the shaman practises this magic art is universal among savages. To this art nothing seems impossible; it intimately affects their conduct and is reflected in their myths. In some cases initiation is required. Thus with the Navajo and Ojibwas they who have successfully passed through the four degrees of the *medéwin* are called *medé*, and are considered competent to foresee and prophesy, to cure diseases and to prolong life, to make fetishes and to aid others in attaining desires not to be realized in any other way. They who have received instruction in one or two degrees usually practise a specialty, e.g., making rain, finding game, curing diseases, For this women are eligible. Most commonly the shaman is a man. Among the Yakuts, the Carib tribes and in northern California there are female as well as male shamans; and in some cases male shamans have to assume women's dress. Every Maori warrior is a shaman. In Samoa there is no regular caste, but in other Polynesian groups the shaman is the exclusive privilege of an hereditary class of nobles. In the practice of his art the shaman is regarded as (1) a healer, hence the term «medicine man,» and the secret medicine societies of the Seneca, and of other American tribes; (2) an educator, i.e., the keeper of myth and tradition, of the arts of writing and divination; he is the repository of the tribal wisdom; (3) a civil magistrate; as seers possessing secret knowledge with power at times of assuming other shapes and of employing the souls of the dead, they are credited with ability to detect and punish crimes; (4) a war-chief; thus with the Dakotas and Cheyennes the head war-chief must be a medicine-man. Hence the shaman possesses great influence and in many cases is the real ruler of the tribe. The means which he uses are (1) symbolic magic, on the principle that association in thought must involve similar connection in reality; (2) fasting with solitude and very generally bodily cleanness and incantations usually in some ancient or unmeaning language and at times obscene; (3) dances and contortions with use of rattle and drum and a distinctive dress decked with snakes, stripes of fur, little bells. The frenzy and contortions lead to an ecstatic state which is considered of the greatest importance. In South America drugs are used to induce stupor; (4) possession; thus in Korea the *pan-su* is supposed to have power over the spirits, because he is possessed by a more powerful demon whose strength he is able to wield.

Shamanism is closely akin to fetishism, and at times it is difficult to tell whether the practices in vogue among certain peoples should be referred to the one or to the other. Both spring from Animism; both are systems of savage magic or science and have certain rites in common. Yet the differences consist in the belief that in fetishism the magic power resides in the instrument or in particular substances and passes into or acts upon the object, whereas in shamanism the will-effort of the magician is the efficient factor in compelling souls or spirits or gods to do his will, or in preventing them from doing their own. Shamanism takes for granted the theory that fear is the origin of religion. Shamanism is not a religion. The religious priest beseeches the favor of the gods; the shaman is believed to be able to compel and command them to do his will. Hence the term is not to be regarded as a name for a principal form of religion but for important phenomena and tendencies of Animism. Consult 'Reports of the Bureau of American Ethnology' (Washington, D. C., annually); Achelis, T., 'Moderne Völkerkunde' (Stuttgart 1896); id., 'Abriss der vergleichenden Religionswissenschaft' (Leipzig 1904); Frazer, J. G., 'The Golden Bough' (New York 1900–12); Müller, 'Contributions to the Science of Mythology' (London 1897); Lang, 'Myth, Ritual and Religion' (ib. 1887); Keane, 'The World's Peoples' (New York 1908); Furlong, 'The Faiths of Man' (London 1906); *Journal* of American Folklore (January 1908); Tumholtz, C., 'Unknown Mexico' (New York (1902); Maddox, J. L., 'The Medicine Man' (New York 1923).

SHAMASH, or **SAMAS**, the sun god of Babylonia and Assyria. Inscriptions designate him as the offspring of Sin, the moon god, the moon power in the earlier, nomadic times being

the dominant deity. With the development of agriculture the importance of the sun god grew, and he became one of a triad with Sin, the moon god, and Ishtar, the earth god. To Shamash were attributed powers of justice and right, evil being supposed to flee before the power of light, and he was likewise the god of healing. His wife was A, Aa, or Ai, and in inscriptions is the "lady of mankind" and the "lady of the countries." His children were Kettu (justice) and Mesharu (right), although these are also referred to with other minor sun gods, such as Bunene, as servitors of Shamash. Ninib, the sun god of the morning and of spring, and Nergal, god of moon and summer, however, retained their powers under the headship of Shamash. The principal places of worship were Sippara, the Sepharvaim of the Bible; and Larsa, the modern Senkereh; the sanctuary in both cities being called E-barra or E-babbara, "the shining house." Other temples of his worship were built at Babylon, Ur, Nippur, and Nineveh.

SHAMOKIN, sha-mō'kĭn, Pa., borough in Northumberland County; altitude 730 feet; on Shamokin Creek, a tributary of the Susquehanna River; 18 miles southeast of Sunbury and 45 miles northeast of Harrisburg, the state capital; on the Reading, and the Pennsylvania railroads. It is the industrial and commercial center of a region rich in anthracite coal. The leading industries are silk, knitting, and linen mills; beef and pork products plants; dress, shirt, yarn, and hair net factories. A great number of the inhabitants of the borough are employed in the mines in the vicinity. St. Edward's Roman Catholic Church, erected in 1873, is said to have been the first church in the world lighted by electricity. The majority of the inhabitants are native born, but there are a number from Wales, Poland, Hungary, Germany, and also from England, Ireland, and Scotland. Coal was found here as early as 1770. Shamokin was settled in 1835 by people employed in developing the coal mines, and coal mining began here on a large scale in 1840. Most of the borough's buildings occupy the bottom of a mountain bowl, while its irregularly arranged streets stretch up the surrounding slopes. Pop. (1940) 18,810; (1950) 16,879.

SHAMROCK, a name derived from the Irish *seamrog,* meaning "trefoil," and applied to various trifoliate plants native to Ireland, and even to the water cress (which is not three-parted). Each is said to be the plant picked by Saint Patrick as a symbol to illustrate the doctrine of the Trinity. The shamrock is worn on Saint Patrick's Day, March 17, and has come to be regarded as the national plant of Ireland. The black medic (*Medicago lupulina*), *Oxalis acetosella,* various clovers, such as the common red clover (*Trifolium pratense*), a trailing hop clover, with small leaves and yellow heads (*Timinus*), and the common low, white clover (*T. repens*), are widely sold as the true shamrock, and exported in large quantities to the United States and other countries, where Irishmen make a custom of wearing the sprays on Saint Patrick's Day as a reminder of home associations.

SHAN STATES, a group of states in central Indochina, named from the Shan (or Tai) who inhabit them. The 6 Northern and 28 Southern Shan States of eastern Burma, federated in 1922 and in 1947 still administered as part of British Burma, have an area of 57,816 square miles, and an estimated population of 1,615,765. The Shan territory, traversed by the Salween River and its branches, extends roughly from a line drawn north and south through Mandalay to the most easterly point of Burma, on the Mekong River, forming an approximate triangle. Agricultural activities include the growing of rice, sugarcane, cotton, and tea, and the breeding of horses and cattle. There are teak forests and some pine. In 1938 the Northern Shan States produced 5,920,000 troy ounces of silver; and there are considerable quantities of soft coal, and some gold in the river bottoms. The inhabitants are of the southern Mongoloid group of peoples, and are said to have originated in southwest China. They are ethnologically related to other groups in Indochina, south China, and Assam, and linguistically (through their common use of the Tai or Shan language) to the Karen of central Burma and to certain of the Siamese. Taunggyi, the chief town, and the meeting place of the Council of Chiefs, is in the southwestern part of the territory, near the terminus of a railway from Thazi, on the line from Rangoon to Myitkyina.

SHANG or **YIN DYNASTY,** an early Chinese dynasty (c. 1523–1027 B.C.), of unknown origins, the rulers of which held sway over a region north and south of the Yellow River, from the Pacific coast perhaps as far west as present-day Shansi. Articles of the Shang period discovered in 1928 in caves along the Huan, a Yellow River tributary, indicate the existence of a feudal system and a state religion, a calendar based on a year of six 60-day cycles, wheeled vehicles, cultivation and storage of grains such as millet, wheat, and perhaps rice, the casting of bronze weapons and tools, and the use of a developed written language of at least 2,000 words. One of the Shang capitals is known to have been established near the site of modern Anyang (Changte), in Honan Province, soon after 1400 B.C. The dynasty may have included as many as 31 monarchs. Its collapse seems to have given rise to the early Korean monarchy. There is a tradition that when the Shang dynasty was overthrown by Chu invaders from the west during the 11th century, certain Shang remnants under Ki Tse (Chi-tzŭ, ki-ja), escaping to Korea, may have set up a kingdom there which lasted some 900 years. See KOREA—*History.*

SHANGHAI, the largest city of China and formerly sixth among the world's ports, is in the province of Kiangsu, near the junction of the Hwangpoo (Whangpoo) and the Woosung rivers, 12 miles from the mouth of the Yangtze River and about 150 miles southeast of Nanking. It is the terminus of the Shanghai-Nanking and Shanghai-Hangchow railways. Linked to the Americas and Europe by sea and air, and to China's hinterland by the Yangtze River, railways, and highways, Shanghai is the largest port in the Far East, and has been called the New York of China.

It has an area of over 300 square miles, and formerly was divided into two areas: the sections directly under Chinese sovereignty; and the sections which included the International Settlement and the French Concession. The Chinese areas,

particularly Nantao and Chapei, are called Old Shanghai, the center of which was once surrounded by a wall 24 feet high, pierced by six gates. This section grew up without planning, so that the streets are narrow and dirty, and the buildings low and crowded; but modern sanitation and other improvements are being introduced. In 1930 the national government began an extensive building program to develop Greater Shanghai as a model Chinese municipality. The program mapped by the City Planning Commission of Greater Shanghai included a mayor's building, a library, a museum, a medical center, school buildings, a sport center, and airdromes. Scores of new Chinese hotels equipped with modern appliances sprang up and new apartment houses and modern office buildings were constructed. Japan's invasions of Shanghai in 1932 and 1937 put an end to this program and destroyed many new buildings already finished. The foreign settlement, which suffered no damage during either of the Japanese attacks, stands on the left bank of the Hwangpoo, below the Chinese city, from which it is separated by a moat spanned by several bridges. It is composed of what was formerly the French Concession and the International Settlement, the latter being made up of the original United States and British concessions. The former foreign settlements contain the principal commercial centers, the Bund (central section along the river), and foreign residential quarters. Before the abolition of the foreign concessions in Shanghai, the French Concession, the International Settlement, and the Chinese city were administered separately, each having its own courts and police system. The French Concession and the International Settlement were controlled by councils dominated by the foreign residents. Post-concession Shanghai is governed by a mayor appointed by the national government; it is one of the special municipalities of China. After eight years of Japanese occupation, practically all public installations, such as roads, wharves, bridges, and other municipal constructions were returned to China in a dilapidated state. Plans were made to start reconstruction along various lines: city planning, and construction of roads and thoroughfares, bridges, wharves, and buildings. Serious inflation, soaring prices, strikes, and material and housing shortages hampered the Shanghai program, so that in 1947, Shanghai was one of the most expensive cities in the world to live in.

Shanghai has water communication with about one third of China, and the steamship lines operating in Shanghai carry cargo and passengers to and from all parts of the world. The port of Shanghai extends from the upper branch of the Hwangpoo to Woosung, a distance of about 12 miles, connected by rail, anchorage for large vessels extending four miles below the former settlement. The anchorage used to be divided into sections, defining the foreign from the Chinese boundary, all vessels being anchored abreast and lettered according to their positions, and steamers being separated from sailing ships. The harbor in Shanghai is not very deep, and because of the silt flowing into the harbor from the river it is becoming still shallower. During the Japanese occupation, dredging of the harbor was not kept up. In the first year following Japan's surrender, Shanghai did not recover its position as the Orient's leading port.

Prewar Shanghai accounted for a substantial part of the republic's foreign trade. The principal exports are tea, tung oil, bristles, silk, silk materials and products, beans and bean cake, cotton goods, and piece goods. The chief imports are all types of manufactures, chemical products, metals and metal manufactures, food, tobacco, rice, wheat, and textiles. To offset the unfavorable balance of trade, the national government in 1946 removed export duties and restricted certain imports. In 1946 the city's trade was still far from normal. Over half of China's prewar industries were concentrated in the Shanghai area, but a great majority of them had not resumed production. Practically all the foreign and Chinese banks have their headquarters in Shanghai. The chief mission establishments in China, including several Christian colleges and high schools, are also concentrated there. Americans, British, French, and other nationals have their own churches, schools, and social organizations. Shanghai is a cosmopolitan center for the Orient.

Shanghai was one of the first ports opened to foreign trade after the Opium War of 1839–1842. The International Settlement and the French Concession were established in 1842–1845 and 1849 respectively. After the first Chinese-Japanese War, in 1895, foreign factories were established in Shanghai, and about 1900 its harbor was improved. After the birth of the Chinese Republic, Shanghai developed rapidly into a leading city. When the nationalist army under Generalissimo Chiang Kai-shek occupied it in 1927, the city government of Greater Shanghai was formally inaugurated under the direct control of the national government. In 1932 the Japanese bombarded Shanghai and occupied part of it for about three months; and from August to November 1937, China defended it at a tremendous sacrifice against the second Japanese invasion. After Pearl Harbor, Japan assumed control of the foreign settlements in Shanghai. In 1943, China concluded new treaties with Great Britain and the United States abolishing the international settlements and foreign concessions in China, including those in Shanghai. After eight years of occupation the Japanese formally returned Shanghai to the Chinese in September 1945. Pop. (official est. 1945–1946) 3,766,111.

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SHANGHAI, a breed of fowls. See POULTRY.

SHANHAIKWAN, shän'hī'kwän', China, a town in northern Hopei, where the Great Wall ends at the Gulf of Liaotung, on the railway from Tientsin to the Manchurian provinces. Historically important as a defense point, it was taken by the Japanese in 1932 as a key to the Province of Jehol, which they included in their puppet state of Manchukuo. Pop. (est.) 30,000.

SHANKLIN, William Arnold, American clergyman and educator: b. Carrollton, Mo., April 18, 1862; d. New York, N. Y., Oct. 6, 1924. He was graduated at Hamilton College in 1883 and took his S.T.B. at Garrett Biblical Institute in 1891. He was ordained in the Methodist Episcopal ministry in 1889, and held pastorates in Kansas, Washington, Iowa, and Pennsylvania in 1887–1905. He was president of Upper

Iowa University in 1905–1909, and from 1909–1923 president of the Wesleyan University.

SHANKS, William Franklin Gore, American journalist: b. Shelbyville, Ky., April 20, 1837; d. Hamilton, Bermuda, Feb. 22, 1905. He was a war correspondent for the New York *Herald* during the Civil War, afterward held various editorial posts on that and other New York papers, and was managing editor of *Harper's Weekly,* 1867–1869. While city editor of the *Tribune* he was imprisoned for contempt of court for refusal to divulge the name of the writer of an article in the paper, taking the ground that he was a privileged witness. After his release he brought charges against District Attorney Winchester Britton, who was removed by Governor Dix. In 1880, he instituted suit, for the first time in the United States, against the vendor of a libel, recovering two judgments, and the Court of Appeals sustained the legal point at issue. In 1885 he organized the National Press Intelligence Company. He is the author of *Personal Recollections of Distinguished Generals* (1865); *A Noble Treason,* a tragedy (1876) and *The Ring Master.*

SHANLY, Walter, Canadian railway engineer and legislator; b. Stradbally, Queen's County, Ireland, Oct. 11, 1819; d. Montreal, Dec. 17, 1899. He studied civil engineering and in 1836 emigrated to Canada. He was resident engineer of the Beauharnois and Welland canals in 1843-1848; of the Northern New York Railroad in 1848–1851; and chief engineer of the Ottawa and Prescott Railway in 1851–1853. In 1853 he became chief engineer of the western division of the Grand Trunk Railroad and he was its general manager in 1857–1862. In 1869–1875 he was engaged in building the Hoosac Mountain Tunnel in Massachusetts, the greatest achievement of his career. He was chief engineer of the Canada Atlantic Railway in 1879–1885, and thereafter was its consulting engineer. He was a member of the Canadian Assembly in 1863–1867, and after the confederation served in the Dominion Parliament in 1867–1872 and in 1885–1891.

SHANNON, shăn'on, **Wilson,** American politician: b. Belmont County, Ohio, Feb. 24, 1802; d. Lawrence, Kans., Aug. 30, 1877. He had a collegiate and law training and began practice at St. Clairsville, Ohio. In 1832 he became attorney for Belmont County, and in 1838 Democratic governor of the state. After the interim of one term he was re-elected in 1842. During 1844–1845, until the suspension of diplomatic relations, he was minister to Mexico by appointment of President Tyler; and after his return he practiced law in Cincinnati. He was elected to Congress in 1852, where he served on the committee on foreign affairs. In 1855 he was appointed by President Pierce to succeed Andrew H. Reeder as governor of Kansas. The contests of the pro- and anti-slavery factions among the people to gain possession of the legislature made the post an exceedingly onerous one, especially for one who endeavored to administer affairs impartially. He resigned in August of the following year. After the political troubles of Kansas had subsided he returned to the state to reside.

SHANNON, a river in Ireland, the largest in the country; rises at the foot of the Cuilcagh Mountains, in the northwest of County Cavan, flows west southwest, through Lough Allen, then takes an irregular course, generally south, to Lough Rea, then southwest to Lough Derg, then south to Limerick where it becomes a tidal stream. From here on to its mouth are several expansions and it enters the ocean by a broad estuary. The various lakes through which it passes are in part real lake basins and partly river expansions. The total length is 254 miles. By means of improvements which cost about $5,000,000, the river has been made navigable from Lough Allen to Limerick, and the Grand and Royal canals, which connect the river with Dublin, have increased its commercial importance. A great hydroelectric development, designed to provide power for a large part of the industries of the republic, was begun in 1925 and was completed in 1929.

SHANNON, The. See CHESAPEAKE AND SHANNON, BATTLE OF.

SHANSI (West of the Taihang Mountains), a province of China, in the loess highlands between the Mongolian steppes and the agricultural regions. Its area is about 60,393 square miles. The Great Wall forms its northern boundary, and it is separated from Shensi, to the west, by the Yellow River, flowing south on the eastern side of its great bend. Shansi's rugged surface contrasts sharply with the level tracts in neighboring Hopei and Honan. Only about 10 per cent of Shansi (in the north, south, and central sections) is level. Except for the Nitao (Nitwo), which flows through Hopei to the sea, Shansi's chief rivers, largely unnavigable, are tributaries of the Yellow River. Taiyuan (Yanku), the capital, and Tatung, an important city in the northern corner, are connected with Peiping by rail. One section of the railway which will connect Tatung with Yungtsi (Puchow), an important city in the southernmost corner, was still uncompleted in May 1947. Shansi does not produce enough grain for its population. The principal grains are wheat, millet, and kaoliang, and there is a great variety of vegetables and quantities of fruits, particularly grapes. Coal deposits in Shansi, estimated at about 36,000,000,000 metric tons (the richest in China) are said to be sufficient to supply China's needs for centuries. Other minerals include iron and copper. Pop. (official est. 1945–1946) 11,601,026.

SHANTUNG, is a northern maritime province of China with an area of 55,560 square miles. Notable in Chinese history as the home of Confucius and Mencius, it is one of China's densely populated regions. The province includes the Shantung Peninsula, opposite Liaotung. These two peninsulas, separated by Tengchow Strait, control the entrance to the Gulf of Pohai. The greater portion of Shantung is level, but its peninsular areas are mountainous, with parts rising over 3,000 feet above sea level. Mainly because of the lack of rivers, there is little alluvial soil along the coast. The shores are generally bold and full of indentations, some of which have good harbors, providing Shantung with some of China's important seaports, including Tsingtao, Chefoo, and Weihaiwei. These ports have a significant chapter in China's for-

eign relations. Chefoo was opened to Western trade as a result of the 1858 treaty with Great Britain, and Weihaiwei and Tsingtao were leased to Great Britain and Germany respectively. Shantung Province is dotted with lakes and intersected by the Yellow and Chiaolai rivers, and the Grand Canal. In 1938 the dike of the Yellow River was cut to stop Japan's drive southward, and the river subsequently changed its course, entering the Yellow Sea from Kiangsu instead of following its old course through Shantung to Pohai. With UNRRA's assistance, plans were made to force the Yellow River back to its former bed in order to reclaim vast agricultural lands. The Tientsin-Pukow Railway runs through the province, and the Kiaochow-Tsinan Railway links Tsingtao and Kiaochow Bay with Tsinan, the capital. Inland navigation is augmented by the Grand Canal, which traverses the western part of the province, affording great trading advantages. Shantung's chief crops are rice, wheat, corn, kaoliang, millet, and peanuts. Coal and iron are important minerals. Although it has never been an industrial center of China, Shantung is known for some of its exports to foreign markets, notably Shantung or pongee silk, and straw braid. Industrial backwardness, population pressure, and natural and human calamities have impoverished the greater proportion of the people.

Shantung became a center of international conflict after Germany forced China in 1898 to lease Kiaochow, including Tsingtao, and to grant railway concessions. About two weeks after the outbreak of World War I, Japan seized Kiaochow and obtained secret agreements from the Allied powers recognizing her claims over Shantung. At the Paris Peace Conference of 1919 the representatives of the powers admitted Japan's claims over German interests in Shantung despite the strong protest of China; hence the Chinese delegation refused to sign the Treaty of Versailles. At the Washington Conference in 1922, Japan agreed to withdraw her troops from Shantung and to return the leased territory of Kiaochow to China. Before 1937, Japan twice sent troops to Shantung, and from 1937 to 1945 occupied it. Not long after Japan's surrender the province became the scene of sanguinary warfare between Nationalist and Communist armies. Tsingtao, the last government stronghold, surrendered to the Communists on June 3, 1949. Pop. (est. 1945–1946) 38,410,867.

SHAPE. See SUPREME HEADQUARTERS, ALLIED POWERS EUROPE.

SHARI (CHARI), a large river in central Africa, which enters the south side of Lake Tchad by several mouths after a course of about 700 miles from the southeast.

SHARKS, an extensive group of elasmobranch fishes of the order Selachii, in which the claspers are complex in structure and the pectoral fins supported on the shoulder-girdle by three basal axial cartilages which may be more or less subdivided, and which bear the cartilaginous fin rays chiefly or exclusively on one side. The external parts of the fins are supported by delicate horn-fibers or actinotrichia. From the rays and skates the sharks are distinguished by the position of the branchial clefts, which are always lateral, by the fan-shaped pectoral fins, and by the shape of the body, which is almost always elongated, rounded and tapering to the strongly heterocercal tail.

The sharks breathe by gill-sacs or pouches, which open externally on the neck by gill-slits, of which there are five to seven pairs. Water may also be admitted to the gills through the spiracles, a pair of openings on the upper side of the head representing an interior pair of gill-slits which are never large and often absent. The mouth exists on the under surface of the head, a conformation compelling some of these fishes to turn on their backs to bite conveniently objects at the surface. The skin is usually provided with small tooth-like granules in the form of placoid scales; and is used under the name of *shagreen,* in the manufacture of various articles, such as purses, spectacle-cases, or as a substitute for sandpaper. The eggs may be laid in capsules or cases of horny material, within which the embryos are protected, the egg-cases being moored or fastened by filaments to rocks or fixed objects, and the young form escaping in due time from its covering. The egg-cases of dog-fishes are frequently cast up on the shores, and receive the fanciful or popular name of "mermaids'-purses," "sea-purses," and the like. The majority of the sharks are, however, viviparous and in some the embryos are nourished by means of placenta-like structures. The skeleton never attains a high degree of perfection, but is chiefly cartilaginous. The skull exhibits no indications of divisions into distinct cranial bones, although the jaws are well developed and calcified. The intestine is provided with a spiral valve which serves to increase the area over which the food has to pass, and the base of the aorta contains rows of valves.

The species of sharks are numerous and so varied in structure that the living forms alone have been arranged in about 20 families. With the single exception of *Eulamia nicaraguensis,* which inhabits Lake Nicaragua, all are marine, only a few occasionally entering the large rivers of India. Owing to their active, roving habits, most of them are widely distributed. With perhaps half a dozen exceptions all sharks are strictly carnivorous and predaceous, and because of their ferocity several of the large species are justly feared.

Species of Sharks.—The white shark or man-eater (*Carcharodon carcharias*) is white below and brown on the upper parts. It is probably the best known of the sharks, and is found in most seas. (See MAN-EATER). The blue shark (*Carcharinus glaucus*), also known as man-eater, is slaty-blue on the upper, and white on the under parts. It may attain a length of 20 feet or more, and is exceedingly destructive to shoals of food-fishes, pursuing its prey even into the fishermen's nets. Both of these occur occasionally on our coasts, where the dusky shark (*C. obscurus*) closely related to the last, but smaller, is very common. The thresher shark (*Alopias vulpes*), is known by the exceedingly elongated upper tail-lobe, which the fish uses after the fashion of a powerful flail when it attacks a school of fish. It feeds chiefly on fishes, and occasionally visits our coasts. The average length varies from 12 to 15 feet. A very common small species along the Atlantic coast is the sand shark (*Carcharias littoralis*), which has very acute teeth mostly provided at the base with one or two cusps. The

hammer-headed shark (q.v.) is at once recognized by the lateral elongation of the head to form a hammer-like structure. The porbeagle shark (*Lamna cornubica*) may attain a length of six feet, and is grayish-black. It has slender, very acute teeth and is quite a common visitor to our coasts, where it is also known as the mackerel-shark. The basking-shark (*Cetorhinus maximus*) attains a length of from 30 to 36 feet, being the largest of all sharks, and is found around our coasts but is chiefly an Arctic species. The name is derived from its habit of lying motionless on the surface of the water in the sun, often in schools. It is sluggish and, in spite of its huge size, harmless and feeds on fish. The head and teeth are small, the dorsal fin very large and the gill-slits long. The Greenland, northern, or sleeper shark (*Somniosus microcephalus*) attains a length of 18 feet, and is brown, shaded with deep blue. It feeds upon the carcasses of whales, even attacks living whales, and is chiefly found in the Arctic seas. The spinous shark (*Echinorhinus spinosus*) is so named from the presence of the spiny scales scattered over its integument. The average length is seven or eight feet. It is common on the Atlantic coasts of Europe and Africa, and has been taken once on Cape Cod.

Of the dog-fishes (q.v.) may be mentioned the smooth dog (*Galeus canis*), and the picked dog-fish (*Squalus acanthias*). Two very remarkable sharks representing groups now nearly extinct are the Port Jackson shark (see Cestracion) and the frilled shark (*Chlamydoselache anguineus*). The former is remarkable for the pavement-like teeth and stout fin-spines and the latter for its eel-shaped body, diphycercal tail, frilled gill-clefts and prominently lobed teeth. The former occurs in Australian, the latter in Japanese waters. Another very recent discovery in the latter region is *Mitsukurina owstoni*, unique among living sharks in its prolonged snout and protruding mouth. The sawsharks (*Pristiophoridae*), which bear a doubly serrate process on the snout like the sawfishes (q.v.), are otherwise shark-like; and the angel-sharks (*Squatinidae*), with much flattened bodies, lead to the skates and rays.

The varieties of extinct sharks are still more numerous and vary from the delicate little acanthodians, only a few inches long, of the Carboniferous, to the huge Tertiary carcharodons, whose five-inch teeth indicate a length of 75 feet. Many of the Palaeozoic sharks were of types very different from any now living.

Usefulness.—The liver of some sharks contains a large quantity of oil, and they are accordingly caught in great numbers in some places, and the oil extracted. Shark-fishing constitutes an industry of some importance on the coast of Russian Lapland and the northern portion of Norway. Those caught here are chiefly the basking shark and the Greenland shark. The Norwegians employ decked vessels of 20 to 30 tons burden, which carry on the fishery as much as 100 or 150 miles from land, at depths of 250 to 300 fathoms. These vessels carry five or six men. On the coast of Norway, farther to the south, other species of sharks are also caught. In order to attract the sharks the fishermen take an old barrel pierced with several holes, pour oil or grease into it and sink it to the bottom with stones. The oil or grease escapes slowly, and is carried by the currents to a distance, thus attracting the keen-scented fishes to the place where the boat is stationed. Here they are caught by hooks baited with salted seal's flesh and fastened to the end of strong chains. When a shark is hooked three of the men haul in the chain, while a fourth stands ready with a mallet, weighing about 20 pounds, to stun the fish when its head appears.

The fisheries of China, India and Africa, which have for their object the white shark and other large species for the purpose of supplying the sharks-fin trade of China, are also of great value, and capture annually a total of not less than 100,000 sharks. In the United States shark fisheries have never been developed extensively, practically the only one worthy of mention being the dogfish industry of New England and particularly of Maine, where the livers of the spiny or picked dogfish are tried for oil and the flesh ground into a poultry food. Dogfish oil is used by curriers and as an adulterant of cod-liver oil. In Europe the dogfish fisheries are far more extensive and, besides the oil secured from the livers, the flesh yields an extract which for nutritive properties compares favorably with extract of beef, and is generally edible and likable.

Bibliography.—Jordan and Evermann, *Fishes of North and Middle America* (Washington 1896); Goode and Bean, *Oceanic Ichthyology* (Washington 1895); Goode, *Fisheries Industries of the United States* (Washington 1884); Dean, *Fishes, Living and Fossil* (New York 1895); Kingsley, *Standard Natural History* (Vol. III, Boston 1885); Gunther, *Introduction to the Study of Fishes* (Edinburgh 1880); Woodward, *Vertebrate Paleontology* (Cambridge 1898); Zittel, K. A. v., *Textbook of Paleontology* (2 vols., trans. by Eastman, C. R., New York 1903).

SHARON, shār'ŏn, Pa., city in Mercer County, alt. 850 feet; on the Shenango River and the Erie and the Pennsylvania railroads, 76m. SW. of Erie; with freight service on the New York Central and the Pittsburgh and Lake Erie railroads. Principal industries are steel production, railroad equipment, heavy transformers and electrical equipment, pipe and tube mills. Among its manufactures are automobile lubricants, railroad tank cars, track door hinges, hardware, gas station equipment, and electric transformers. Sharon's public library is stocked with more than 25,000 volumes. By way of cultural organizations, there are the Sharon Players, the Shenango Valley Theater Guild, and the Shenango Valley Symphony. Sharon might be called the capital of the Shenango Valley, as it is a leader among a number of communities with common interests and a marked spirit of civic union. Within a 10-mile radius from the center of Sharon is a population of more than 150,000, sharing cooperatively in community welfare funds, hospital upkeep and benefits, recreational facilities, and the like.

Founded in 1795, Sharon became a borough in 1841; a city in 1918. Pop. (1950) 26,454.

SHARON, Palestine, in biblical geography a plain on the Mediterranean coast of the country, reaching inland to the hills and from Joppa to Caesarea. It was originally of great fertility, with forests and rich vegetation, and is still excellent pasture ground. The beauty

of the district was generally recognized (Isaiah 35:2), and its roses in the Song of Solomon (2:1). The herds of David are mentioned as grazing there (1 Chron. 27:29).

SHARON SPRINGS, village, New York, in Schoharie County 50 miles west of Albany at an altitude of 1,320 feet. It is on modern highways, has freight service via Delaware and Hudson Railroad, and passenger connection with the New York Central at Fort Plain. Its picturesque location and its mineral springs make it a summer resort and watering place. Pop. (1950) 361.

SHARP, Abraham, English mathematician: b. Little Horton, 1651; d. Yorkshire, July 15, 1742. Having studied and taught mathematics in Liverpool, he was employed by John Flamsteed in the Greenwich Observatory and made for him, in 1688–1689, Flamsteed's first successful instrument, a mural arc. Afterward he taught mathematics in London and subsequently retired to Little Horton, where he devoted himself to mathematics and to making astronomical and calculation instruments, and is said to have been the first Englishman to make these accurately. He published a book of logarithms, the first of its kind, was a joint author with Crosthwait of *The British Catalogue* and plotted a number of important astronomical maps.

SHARP, Cecil James, English musician and music anthologist: b. London, Nov. 22, 1859; d. Hampstead, June 23, 1924. A graduate of Clare College, Cambridge, during a decade in Australia he was assistant organist of the Adelaide cathedral, conductor of the Philharmonic Society, and co-director of the Adelaide College of Music. He also composed two light operas and several smaller pieces. Returning to England in 1892, he soon became a power in the musical world and an eminent authority on folk songs. *Folk-Songs from Somerset* in five series (1904–1909) is one of his anthologies. His discovery of 5,000 tunes and variants of early 18th-century songs in remote coves of the Appalachian Mountains (1916–1918) was epochal. In 1911 he founded the English Folk-Dance Society.

SHARP, Dallas Lore, American educator: b. Haleyville, N. J., Dec. 13, 1870; d. Nov. 29, 1929; he was graduated from Brown University, 1895, from Boston University Theological School, 1899, and ordained to the Methodist Episcopal ministry, 1895. Joining the staff of Boston University in 1899, he became professor of English there in 1909. His published works include *Wild Life Near Home* (1901); *Roof and Meadow* (1904); *The Lay of the Land* (1908); *The Fall of the Year* (1911); *Winter* (1912); *Where Rolls the Oregon* (1914); *The Hills of Hingham* (1916); *The Seer of Slabsides* (1921); *Highlands and Hollows* (1923); *The Spirit of the Hive* (1925); *The Better Country* (1928).

SHARP, Granville, English abolitionist: b. Durham, Nov. 10, 1735; d. London, July 6, 1813. He studied law, but abandoned it to accept a place in the ordnance office. He was the patron of the slave Somerset, whom he found in the streets of London in 1769, having been turned away by his master because of illness. Sharp placed him in a hospital, and on his recovery procured employment for him. Two years later Somerset was claimed by his master, arrested and imprisoned, whereupon Sharp summoned them both before the lord mayor, who discharged the slave. The master still refusing to release him, Sharp brought the case before the court of the King's Bench, which resulted in the famous decision against the legality of slavery in England in 1772.

In 1777 Sharp resigned from the ordnance office because of his disapproval of the American War, and devoted himself thereafter to philanthropy, particularly to the overthrow of slavery. He was chairman of the meeting which in 1787 formed the Association for the Abolition of Slavery and was one of the founders of the Negro colony at Sierra Leone. He was also an advocate of parliamentary reform, opposed dueling and favored the extension of privileges to Ireland. He wrote 61 pamphlets in reference to the causes to which he devoted his life, among which are *Representation of the Dangerous Tendency of Tolerating Slavery in England* (1772), and *Account of the English Polity of Congregational Courts* (1786).

SHARP, James, Scottish ecclesiastic: b. Castle of Banff, May 4, 1613; d. Magus Muir, Saint Andrews, May 3, 1679. He was educated at the University of Aberdeen and was appointed regent there, where his conduct won him the friendship of the clergy. He held a professorship in Saint Leonard's College, Saint Andrews, and was then appointed minister at Crail, Fifeshire. In 1656 he was a representative from the Presbytery to Cromwell, and he managed this mission so well that he was sent in 1660 to Monk and to Charles II. He treacherously agreed to help Monk restore Episcopacy in Scotland, but the time for this coup not being ripe he played the double part of friend to his constituents in Scotland and tool of General Monk in England.

When Parliament established Episcopacy in 1661 Sharp benefited from both parties, being appointed professor of theology in Saint Mary's College, Saint Andrews and king's chaplain for Scotland. He now completely went over to the king's party, was consecrated archbishop of Saint Andrews and primate of Scotland. In 1663 he secured the establishment of a high court commission, in which he took precedence of the chancellor, and the odious persecutions of the Resolutioners by this court, especially the cruelties it inflicted after the uprising in Pentland, made Sharp an object of intense hatred throughout the country, a hatred shared by the king and court, whose tool he was regarded. Falling by accident into the hands of a party of his enemies in 1679, he was dragged from the coach in which he was riding with his daughter and was beaten to death.

Consult Stephen, Thomas, *Life and Times of Archbishop Sharp* (London 1839); Dodds, James, *Fifty Years' Struggle of the Scottish Covenant* (London 1860); *The Lauderdale Papers* (Camden Society Publications, London 1885).

SHARP, William, Scottish writer: b. Paisley, Sept. 12, 1855; d. Sicily, Dec. 14, 1905. He was educated at the University of Glasgow, after which he made a voyage to Australia. In 1879 he settled in London. Among his works is a collection made with the assistance of his wife called *Lyra Celtica*. In verse he published

The Human Inheritance (1882); *Earth's Voices* (1884; *Romantic Ballads and Poems of Fantasy* (1886); *Sospiri d'Italia* (1904). His fiction includes *Children of Tomorrow* (1890); *Silence Farm* (1899). He wrote, also, the biographies of Shelley, Heine and Browning and *Literary Essays; Greek Studies* (1903–1904). Two volumes of his critical work appeared in 1912 and in 1909–1911 appeared a complete edition of his works, 7 vols. See also MACLEOD, FIONA.

SHARP, William Graves, American diplomat: b. Mt. Gilead, O., March 14, 1859; d. Nov. 17, 1922. He graduated from the law school of the University of Michigan in 1881, and for a time practised law. He then went into the iron and chemical business, in which he accumulated a large fortune. He was three times elected to Congress, beginning in 1908. In 1914 he was appointed by President .Wilson ambassador to France, and held that office during the World War I.

SHARP-SHIN, a small hen-hawk (q.v.).

SHARP-SHOOTERS, the name formerly given to the best shots of a company, who were armed with rifles and took aim in firing. They are superseded by the better arms and more complete organization of modern armies. According to the United States army regulations, a sharpshooter is a grade of rifleman next below that of expert rifleman. He wears a silver badge, consisting of a pin and cross, on the left breast of the coat.

SHARP-TAILED GROUSE, the northern prairie-chicken (q.v.), a grouse (*Pedioecetes phasianellus*), which has the general habits of the pinnated grouse, but differs among other features in lacking the neck-tufts, in the characteristic form of the tail, in which the central pair of quills are soft, parallel-edged and square-tipped, projecting an inch or two beyond the next pair. It is somewhat more fond of brushy places and flies more than does the pinnated grouse.

SHARPE, Henry Granville, American soldier: b. Kingston, N. Y., April 30, 1858, d. Providence, R. I., July 13, 1947. He was graduated from the United States Military Academy in 1880, and appointed a second lieutenant in the Fourth Infantry, but resigned from the army in 1882. In 1883 he re-entered the service as a captain on the staff of the commissary department. He was promoted through the grades to brigadier general, commissary general, 1905; brigadier general, Quartermaster Corps, 1912; major general, quartermaster general, 1916, and major general in the line, 1918. He retired May 1, 1920. He was chief commissary at Camp George H. Thomas, Georgia, 1898; and chief commissary of the Division of the Philippines, 1902–1904 and served in France in 1918–1919. He published *The Art of Subsisting Armies in War; The Art of Supplying Armies in the Field as Exemplified During the Civil War; The Provisioning of the Modern Army in the Field; The Quartermaster Corps in the Year 1917 in the World War* (1921).

SHARPE, Samuel, English Egyptologist: b. London, March 8, 1799; d. there, July 28, 1881. He published *The Early History of Egypt* (1836); *Egyptian Inscriptions* (1837); *Vocabulary of Egyptian Hieroglyphics* (1837); *The History of Egypt Under the Ptolomies* (1838); *The New Testament Translated* (1840); *The History of Egypt from the Earliest Times till* A.D. *640* (1846); *The Hebrew Scriptures Translated* (1865).

SHARPLES, James, American artist: b. England, 1751; d. New York, Feb. 26, 1811. He began his artistic career in the United States in 1794 with a series of pastel portraits for which some of the most eminent men of the day gave him sittings, and there are still extant by him portraits of Washington, Jefferson, Hamilton, Monroe, De Witt Clinton, and Burr. These are treasured in the National Museum at Philadelphia, where they were placed, 40 in all, in 1876. He was also interested in mechanics and in the first volume of the *Medical and Philosophical Register* (1811) is a paper by him on steam carriages. He is buried in the churchyard of Saint Peter's, Barclay Street, New York.

SHARPLESS, Isaac, American educator: b. Chester County, Pa., Dec. 16, 1848; d. Jan. 16, 1920. He was graduated from the Lawrence Scientific School, Harvard, in 1873, was instructor in mathematics at Haverford College in 1875–1879, occupied the chair of mathematics and astronomy there in 1879–1885, was dean in 1885–1887 after which he was president of the college. He wrote textbooks of astronomy and geometry and also published *English Education* (1892); *A Quaker Experiment in Government* (1898); *Two Centuries of Pennsylvania History* (1900); *The American College* (1915).

SHARPS, Christian, American inventor: b. New Jersey, 1811; d. Vernon, Conn., March 13, 1874. He developed a taste for mechanics at an early age and practically devoted his life to invention. He was the originator of many ingenious implements, but none of these gave him such fame and remuneration as the breech-loading rifle which bears his name. In 1854 he removed to Hartford, Conn., to superintend the manufacture of this rifle, and he subsequently invented other firearms of great value and patented many ingenious implements of various kinds.

SHARPSBURG, Md., a town in Washington County; altitude 425 feet; beautifully situated in a narrow valley, 12 miles south of Hagerstown, about the same distance north of Harper's Ferry. It was founded in 1763 and named for Gov. Horatio Sharpe. It has no manufactures, but is surrounded by a fine farming country, the chief products of which are corn, wheat, hay, apples, peaches and other fruits. It is chiefly noted as the scene of the Battle of Antietam (q.v.) or Sharpsburg, fought on the outskirts of the village, Sept. 17, 1862, in which more men were killed and wounded than on any other day of the Civil War. Pop. (1940) 834; (1950) 866.

SHARPSBURG, Pa., borough in Allegheny County; altitude 741 feet; on the Allegheny River; served by the Pennsylvania Railroad; 5 miles northeast of Pittsburgh. It was founded in 1826 by James Sharp; incorporated as a borough

in 1841. It is in a coal-mining region. The chief industrial establishments are foundries, steel plants, machine shops, bottle works, planing mill, brewery, and a large railroad classification yard. Other manufactures are blow torches, hardware, welding equipment, grease, beverages, cement and compounds. It exports annually large quantities of its manufactured products. It has two high schools, public and parish elementary schools, and a public library. Pop. (1950) 7,296.

SHARPSBURG (Md.), **Battle of.** See ANTIETAM, THE BATTLE OF.

SHARPSHOOTER, shärp'shōōt-ẽr, popular name in southern United States for any of several hemipterous insects which puncture the immature cotton bolls, causing them to wilt or rot. Of these the *Homalodisca coagulata* is the most common. The Mexican boll weevil is likewise known by the name in some parts of Texas.

SHARSWOOD, shärz'wŭd, **George,** American jurist: b. Philadelphia, Pa., July 7, 1810; d. there, May 28, 1883. He was graduated at the University of Pennsylvania in 1828, and was admitted to the bar in 1831. He served in the state legislature in 1837–1838 and in 1842–1843, and in 1845 was appointed judge of the District Court of Philadelphia, becoming president of that court in 1848. In 1848 he was appointed to the bench of the Supreme Court of Pennsylvania, of which he was chief justice from 1878 until he retired in 1882. He ranked as one of the most eminent jurists in the state. From 1843 to 1846 he edited the *American Law Magazine.* He was professor of law at the University of Pennsylvania in 1850–1867. He brought out editions of many English law textbooks, of which the most famous was *Sharswood's Blackstone's Commentaries* (1859). He was author of *Professional Ethics* (1854); *Lectures Introductory to the Study of the Law* (1870).

SHASTA, Mount, a peak of the Sierra Nevada range in Siskiyou County in California. It is of volcanic origin, about 14,162 feet above sea level, and on its summit are five glaciers, one of which, Whitney, is three miles long. On the slope and near the base are large trees, some 300 feet high. The mountain is conical in form and has been a dormant volcano for a long period. It was discovered in 1827 by P. S. Ogden, and scaled in 1854 by E. D. Pearce.

SHASTA INDIANS, shăs'tà, probably from *tsasdi,* "three," referring to a triple-peak mountain. A group of small tribes forming the Shastean linguistic stock of American Indians, formerly occupying the territory drained by Klamath River and its tributaries from the western base of the Cascade Range to the point where the Klamath flows through a ridge of hills east of Happy Camp, in northern California and extending over the Siskiyou Mountains in Oregon as far as the confluence of Stewart and Rogue Rivers. They have practically lost their native customs through contact with civilization, but they were a sedentary people, living in rectangular, semi-subterranean plank houses, and subsisting chiefly on salmon and other fish, acorns, roots and seeds. They made basket caps (which the women wore), as well as small food baskets and a rude form of dug-out canoe. They rapidly succumbed to the encroachments of civilization, and while the tribes composing the stock were never populous, their total number at present is about 1,000, most of whom are on the Siletz Reservation in Oregon. Mount Shasta derives its name from these Indians.

Consult Dixon, R. B., "The Shasta," in American Museum of Natural History *Bulletin,* vol. 17 (New York 1907); Kroeber, A. L., *Handbook of Indians of California,* Bulletin 78, Bureau of American Ethnology (Washington 1925).

SHATTUCK, shăt'ŭk, **Frederick Cheever,** American physician, brother of G. B. Shattuck; b. Boston, Mass., Nov. 1, 1847; d. Jan. 11, 1929. He was graduated at Harvard University in 1868 and took his M.D. there in 1873. He engaged in practice in Boston in 1875, was connected with the faculty at Harvard from 1879, and from 1888 he was Jackson professor of clinical medicine there. He became professor emeritus in 1912, at the same time retiring from practice. He became an overseer of Harvard in 1913 and was a retired lieutenant in the United States Army Medical Reserve Corps. He was the author of many papers in medical journals.

SHATTUCK, George Brune, American physician: b. Boston, Mass., Aug. 18, 1844; d. there, March 12, 1923. He was graduated at Harvard in 1863 and took his M.D. there in 1869. He was engaged in practice in Boston in 1869–1911, when he retired. He edited the *Boston Medical and Surgical Journal* in 1881–1911. At the time of his retirement he was senior physician to the Boston City Hospital. He was an overseer of Harvard in 1890–1901 and in 1903–1912.

SHATTUCK SCHOOL, The, a noted college preparatory school at Faribault, Minn., about 50 miles south of Minneapolis. The school, organized in 1865, owes its existence to the efforts of the Rt. Rev. Henry Benjamin Whipple, who, very soon after his consecration in 1859 as the first Protestant Episcopal bishop of Minnesota, organized at Faribault the Bishop Seabury Mission, out of which grew the Cathedral of our Merciful Saviour, the Seabury Divinity School, Saint Mary's Hall (school for girls), and the Shattuck School for boys, all widely known. The basis of the mission was a small school which had been established at Faribault in 1858 by the Rev. James L. Breck. Shattuck School was named for Dr. George Cheyne Shattuck, of Boston, Mass., one of its earliest benefactors, who also founded St. Paul's School, at Concord, N. H. The school has trained more than 3,000 boys. Average attendance is about 250, these being drawn largely from well-to-do families of the northwest. Military training is compulsory.

SHAUGHNESSY, Thomas George, 1ST BARON SHAUGHNESSY OF MONTREAL, Canadian railway president: b. Milwaukee, Wis., Oct. 6, 1853; d. Montreal, Canada, Dec. 10, 1923. In 1868–1882 he was connected with the Milwaukee and Saint Paul and the Chicago, Milwaukee and Saint Paul railroads, in which time he gained a mastery of railroad management. He became purchasing agent of the Canadian Pacific Railway in 1882, later was assistant general manager and president of the Canadian Pacific Railway and all its associated companies. He accomplished an important share in the development of Canada and his services were recognized by a knight-

hood in 1901, while in 1916 he was created Baron Shaughnessy of Montreal.

SHAW, shô, **Albert,** American editor and political economist: b. Shandon, Butler County, Ohio, July 23, 1857; d. New York City, June 25, 1947. He was graduated from Iowa College, Grinnell, Iowa, in 1879, took a post-graduate course in constitutional history and economic science there, and in 1881 began a course in history and political science at Johns Hokpins, taking the degree of Ph.D. in 1884. In 1883–1888 and again in 1889–1890 he was on the editorial staff of the Minneapolis *Tribune,* in 1888–1889 he studied in Europe and in 1891 established the *American Review of Reviews,* which he edited until 1937. In 1884 he published *Icaria, a Chapter in the History of Communism,* which was translated into German. His other works include *Co-operation in the Northwest* (1883); *Local Government in Illinois* (1883); *Municipal Government in Great Britain* (1895), and *Municipal Governmental in Continental Europe* (1895). The last two mentioned gave him a recognized standing as an authority on questions of municipal government. Other works are *The Business Career in its Public Relations* (1905); *Political Problems of American Development* (1907); *The Outlook of the Average Man* (1907); *Cartoon History of Roosevelt's Career* (1910), and *Abraham Lincoln,* 2 vols. (1929).

SHAW, Anna Howard, American woman suffrage leader, minister and physician: b. Newcastle-upon-Tyne, England, Feb. 14, 1847; d. Moylan, Pa., July 2, 1919. She came to the United States at the age of four, studied at Albion College, Michigan in 1873–1876, was graduated at the Boston University of Theology in 1878 and took her M.D. at Boston University in 1885. She was granted a local preacher's license by the district conference of the Methodist Episcopal Church, and paid the expenses of her education by preaching and lecturing. She was pastor of the Methodist Episcopal Church at Hingham, Mass., in 1878, and at East Dennis in 1878–1885. She was, however, refused ordination by the New England Conference because of her sex, and the decision was confirmed by the General Conference at Cincinnati in 1880. She was ordained in the Protestant Methodist Church Oct. 12, 1880, the first woman ordained by that denomination. In 1885 she resigned her pulpit to lecture for the Massachusetts Woman Suffrage Association. She was national superintendent of franchise for the Women's Christian Temperance Union in 1886–1892; and in her connection with the National American Woman Suffrage Association she was national lecturer in 1886–1904; vice president at large in 1892–1904; president in 1904–1915; and thereafter was honorary president. To her courage, initiative, resourcefulness and sound reasoning may be credited much of the success of the woman suffrage movement, the constitutional amendment for which was passed by Congress shortly before her death. She was in her lifetime the recipient of world-wide honors, had spoken in every state in the Union, as well as being the first woman to speak in Gustav Vasa Cathedral, and the State Church of Sweden. She was the first ordained woman to preach at the universities of Copenhagen, Berlin, Christiania, London, and Amsterdam. She was chairman of the Women's Committee of the Council of National Defense from 1917, and received the distinguished service cross for her services in World War I.

SHAW, George Bernard (bûr'nĕrd), Irish-born journalist, critic, and dramatist: b. Dublin, July 26, 1856; d. Ayot St. Lawrence, Herts, England, Nov. 2, 1950. He went to London in 1876. Between 1879 and 1883 he wrote five novels entitled: *Immaturity; The Irrational Knot; Love Among the Artists; Cashel Byron's Profession; An Unsocial Socialist. Immaturity* remained in manuscript until its publication in 1930 in the collected edition of Shaw's works. The other four were first published serially in *To-day* and *Our Corner* between 1884 and 1888. Meanwhile, Shaw had become converted to socialism by hearing Henry George and by reading Karl Marx. He joined the Fabian Society in 1884 and shortly after became a leader in the organization. In 1889 he edited *Fabian Essays in Socialism* and contributed "The Basis of Socialism" and "The Transition to Social Democracy" to the volume. From 1886 to 1898 he made a precarious living as a journalist; in 1886–1887 as art critic to the *World,* in 1888–1890 as music critic to the *Star,* under the signature of Corno di Bassetto; in 1890–1894 as music critic to the *World;* and in 1895–1898 as dramatic critic to the *Saturday Review,* where the arresting reviews signed G.B.S. introduced him to the world of the theater. In 1891 he first showed his interest in the new drama by publishing *The Quintessence of Ibsenism.* In 1892 his first play, *Widower's Houses* was produced at J. T. Grein's Independent Theatre. Thereafter, he began playwriting in earnest. When most of his early plays found only brief or sporadic production, he decided to offer them to the reading public instead. In 1898 he published in two volumes *Plays: Pleasant and Unpleasant.* In the *Pleasant* volume were *Arms and the Man; Candida* (q.v.); *The Man of Destiny;* and *You Never Can Tell;* in the *Unpleasant* volume were *Widower's Houses; Mrs. Warren's Profession;* and *The Philanderer.* Also in 1898 appeared his study of Wagnerian music, *The Perfect Wagnerite.* In 1900 came *Three Plays for Puritans* containing *The Devil's Disciple,* which had been successfully produced by Richard Mansfield in New York in 1897, *Caesar and Cleopatra;* and *Captain Brassbound's Conversion.* In 1903 he published *Man and Superman* (q.v.) With this play Shaw's playwriting technique became more discursive and with a few brilliant exceptions discursiveness remained thereafter the most characteristic phase of Shavian dramaturgy, and also the least acceptable in the theater. Between 1904 and 1907 (under the management of J. E. Vedrenne and H. Granville Barker at the Court Theatre) Shaw's plays won a firm place in the theatrical world. At the same time he was being given a hearing in America through the efforts of Arnold Daly. Play after play now followed in rapid succession: *John Bull's Other Island* (1904); *How He Lied to Her Husband* (1904); *Major Barbara* (1905); *The Doctor's Dilemma* (1906); *Getting Married* (1908); *The Shewing-Up of Blanco Posnet* (1909); *Misalliance* (1910); *The Dark Lady of the Sonnets* (1910); *Fanny's First Play* (1911); *Androcles and the Lion* (1912); *Overruled* (1912); *Pygmalion* (1913); and *Great Catherine* (1913). During World War I Shaw's playwriting activity was confined to short plays: *O'Flaherty, V. C.; The*

Inca of Perusalem; and *Augustus Does His Bit.* Late in the war he was engaged in writing *Heartbreak House,* which was published in 1919 and first produced by the Theatre Guild in New York in 1920. The unwieldly pentateuch (cycle of five plays) *Back to Methuselah* (1921) was first performed in New York in 1922 as was his chronicle play *Saint Joan* in 1923. Between 1923 and 1929 there were no new plays, but in 1929, at the age of seventy-three, Shaw made an arrangement with Barry Jackson for the performance of his new and old plays at the Malvern Festival, which was inaugurated that summer. Between 1929 and 1939 the new plays were: *The Apple Cart* (1929); *Too True To Be Good* (1931); *On the Rocks* (1933); *The Simpleton of the Unexpected Isles* (1935); *The Millionairess* (1936); *Geneva* (1938); and *In Good King Charles's Golden Days* (1939). After a lapse of ten years another and perhaps final play, *Buoyant Billions* was produced at Malvern in the summer of 1949.

As a playwright Shaw has taken as his medium the drama of ideas. Within that framework he has presented his radical thinking on most phases of human interest in the fields of economics, politics, sociology, education, philosophy, religion, and art. His most enduring gift to drama has been his talent for comedy. This is to be found in his brilliant, witty style, often satiric or ironic; in his sense of anticlimax; in his cleverness in inventing comic situations; and in his creation of many delightfully comic, though often farcical, characters.

Although Shaw's eventual reputation probably will be determined by his work as a dramatist, he himself has always valued chiefly his contributions to social thinking. His chief publications in this field include: *Commonsense of Municipal Trading* (1904); *Commonsense About the War* (1914); *The Intelligent Woman's Guide to Socialism* (1928); *What I Really Wrote About the War* (1931); *Doctors' Delusions, Crude Criminology,* and *Sham Education* (1932); *The Political Madhouse in America and Nearer Home* (1933); *William Morris as I Knew Him* (1936); *Everybody's Political What's What?* (1944).

Shaw has maintained a voluminous correspondence throughout his life. His private letters display the same brilliance of style found in his plays and prefaces. Many of his letters have already been published, most notably those to Ellen Terry under the title *Ellen Terry and Bernard Shaw, A Correspondence* (1931). Other letters in considerable number are to be found in *Florence Farr, Bernard Shaw, and W. B. Yeats* (1941); Mrs. Patrick Campbell, *My Life and Some Letters* (1922); Doris Arthur Jones, *Taking the Curtain Call* (1930); Lillah McCarthy, *Myself and My Friends* (1933); and in the biographies of Shaw by Henderson and Pearson.

The works of Shaw were published in a limited collected edition in 1930, and beginning in 1931 in a standard edition. This includes his novels, his plays, and his essays and criticism. In England *The Complete Plays of Bernard Shaw* (now incomplete) was published in one volume in 1931, and in 1934 *Prefaces by Bernard Shaw,* also in one volume. The most important critical and biographical treatises on Shaw are the following: P. P. Howe, *Bernard Shaw: A Critical Study* (1915); Archibald Henderson, *Bernard Shaw: Playboy and Prophet* (1932); Hesketh Pearson, *G. B. S. A Full Length Portrait* (1942); *G. B. S. 90,* ed. S. Winsten (1946).

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SHAW, Henry Wheeler, known as Josh Billings, American humorist: b. Lanesboro, Mass., April 21, 1818; d. Monterey, Calif., Oct. 14, 1885. He entered Hamilton College in 1832, but remained only one year. He then went to the West to pursue a number of occupations offered by the primitive frontier life, but returned to the East in 1858, and became an auctioneer at Poughkeepsie. He contributed humorous articles to a local paper under the signature of "Josh Billings," but his writings failed to attract much attention until he employed a style of phonetic spelling resembling his homely method of pronunciation. His first book, *Josh Billings, His Sayings* (1865), had an enormous success. For many years he contributed to the *New York Weekly.* His most successful literary venture was a travesty on the *Old Farmer's Almanac,* published for many years by the Thomas family, *Josh Billings' Farmers' Allminax.* Over 200,000 copies were sold within two years of its appearance in 1870. In 1863 he began to give public lectures, which consisted of detached bits of homely philosophy, usually pointing a moral. The delivery having an inimitable strain of drollery made him a great popular success. He published *Everybody's Friend* (1874); *Josh Billings, His Works Complete* (1876); *Josh Billings' Trump Kards* (1877); *Josh Billings' Spice Box* (1881).

SHAW, Lemuel, American jurist: b. Barnstable, Mass., Jan. 9, 1781; d. Boston, Mass., March 30, 1861. He was graduated at Harvard University in 1800 and became prominent in the practice of law in Boston. He sat in the Massachusetts house of representatives and senate, 1811–1816 and in 1819, and in the state senate 1821–1822 and 1828–1829, and was a member of the State Constitutional Convention of 1820. As chief justice of the Massachusetts Supreme Court, 1830–1860, he won a high reputation as a jurist. He was a fellow of the American Academy of Arts and Sciences; a member of the Massachusetts and New England Historical Societies and of various local clubs, and a trustee of the Boston Library and Humane societies. He translated from the French the *Civil and Military Transactions of Bonaparte.*

SHAW, Leslie Mortier, American lawyer: b. Morristown, Vt., Nov. 2, 1848; d. March 28, 1932. He was graduated from Cornell College, Mount Vernon, Iowa, in 1874, and from the Iowa College of Law in 1876; was admitted to the bar and established a law practice in Denison, Iowa. He was also prominent in local financial circles and became president of the bank of Denison, and of the bank of Manilla, Iowa. He occasionally took part in the campaign work of the Republican Party, but did not become prominent until the campaign of 1896, when his strong advocacy of the gold standard, his skillful handling of statistics and keen arguments in public speaking won him a wide reputation, and he was called upon to speak in many different sections of the country. His effective work on the Republican side in the free silver campaign of 1896, speaking an average of from five to seven hours daily, led to his

nomination and election the following year as governor of Iowa. He was re-elected two years later, doubling his plurality and multiplying his majority by four. He declined a third nomination. In 1898 he was president of the International Monetary Congress at Indianapolis. At the end of his second term as governor he became secretary of the treasury in President Theodore Roosevelt's cabinet and held that position a little over five years. He resigned in 1902 and was engaged in banking in New York and Philadelphia until 1913 when he retired.

SHAW, Richard Norman, British architect: b. Edinburgh, Scotland, May 7, 1831; d. Hampstead, England, Nov. 7, 1912. Shaw is best known for the revolution he led in domestic architecture when he broke away from the Victorian "Gothic" and designed houses in the Queen Anne and Georgian styles, using the traditional red brick, with tiled roofs. His country and London houses in the grand manner had great charm, and his economical small houses, designed in the late 1870's, were copied throughout England. In 1877 he was elected to the Royal Academy. At 23 he had received a traveling scholarship from it—after seven years' apprenticeship to a London architect. His travels bore fruit in his *Architectural Sketches from the Continent* (1858). In 1891, with Thomas G. Jackson as joint editor, he published *Architecture, a Profession or an Art?*

SHAW, Robert Gould, American soldier: b. Boston, Mass., Oct. 10, 1837; d. Fort Wagner, Charleston Harbor, S. C., July 18, 1863. He studied at Harvard, entered a New York business office, enlisted in the 7th New York Regiment at the outbreak of the Civil War, and was promoted captain (1862). In 1863 he was made colonel of the 54th Massachusetts Volunteers, the first Negro regiment sent from the free states. The regiment left Boston for the front May 28, acquitted itself satisfactorily in a skirmish on James Island, near Charleston, S. C., July 16, and on July 18 participated with distinction in the desperate attack on Fort Wagner. Shaw was killed while leading his troops. The well-known Shaw memorial by Augustus Saint-Gaudens was placed in 1897 on Boston Common.

Consult Higginson, Thomas W., ed., *Harvard Memorial Biographies,* vol. 2 (Cambridge, Mass., 1866); Teamoh, Robert T., *Sketch of the Life and Death of Col. Robert Gould Shaw* (Boston 1904).

SHAW, Sir **William Napier,** English physicist: b. Birmingham, England, March 4, 1854; d. London, March 24, 1945. He was educated at Emmanuel College, Cambridge, and at the University of Berlin, was elected fellow of Emmanuel College (1877) and was senior tutor there (1890–1899). From 1897 to 1905 he was a member of the Meteorological Council and in the latter year became director of the Meteorological Office. From 1920 to 1924 he was professor of meteorology at the Royal College of Science.

Among his publications are *The Air and Its Ways* (1923), *The Smoke Problems of Great Cities,* with J. S. Owens (1925); and *Forecasting Weather* (1939). He was knighted in 1915.

SHAW-LEFEVRE, lĕ-fē'vĕr, **George John,** (1st Baron Eversley), English statesman: b. London, England, June 12, 1831; d. Winchester, April 19, 1928. He was educated at Eton and at Trinity College, Cambridge. In 1855, on completion of his studies in law, he was called to the bar, and from 1863 to 1895 sat as a Liberal in the House of Commons, where his maiden speech was a plea for the Northern cause in the American Civil War. He held many government posts. Among them was secretary to the Board of Trade (1869–1871), secretary to the Admiralty (1871–1874), member of the Gladstone cabinet as postmaster general (1883–1885) and first commissioner of works (1892–1894), and president of the Local Government Board (1894–1895) under Lord Rosebery. Defeated for re-election in 1895, he became a member of the London County Council (1897–1901), where he worked for slum removal. He was raised to the peerage as Baron Eversley of Old Ford in 1906.

SHAW UNIVERSITY, an institution for the education of Negroes at Raleigh, N. C. It was founded under the auspices of the American Baptist Home Mission Society primarily for the education of Negro preachers for the Baptist ministry. Henry Martin Tupper was appointed president, and in 1865 organized the first classes in a Negro cabin on the outskirts of the city. In March 1866 the first class for Negro women was enrolled. Since then the school has been coeducational. In 1870 the present campus, including a whole city block, was purchased, and the buildings were put up with brick made by the students. The university was chartered by the state legislature in 1875. It now includes the Normal, Collegiate Scientific, and Industrial departments, the Theological School, the Missionary Training School, the Leonard Schools of Medicine and Pharmacy, and the Law School. The degrees of A.B. and B.S. are conferred.

SHAWINIGAN FALLS, shâ-wĭn'ĭ-gân, city, Quebec, Canada, in St. Maurice County on the St. Maurice River 21 miles north of its confluence with the St. Lawrence at Three Rivers. An important industrial city, it is situated immediately above the great 160-foot falls on the St. Maurice, one of the largest and most beautiful cataracts in Canada. From it a large hydroelectric plant produces power to the extent of nearly 500,000 horsepower. The chief local industries produce pulp and paper; acids, alkalies and salts; aluminum and smelter products. The city is served by branches of the Canadian National and Canadian Pacific railways, which connect with Montreal. It was founded in 1899 and incorporated as a city in 1909. Pop. (1951) 26,903.

SHAWINIGAN SUD or **SHAWINIGAN SOUTH,** town, Quebec, Canada, adjacent to Shawinigan Falls. Chiefly residential, it has a few industries, such as small sawmills and bakeries. Incorporated with Almaville in 1953, its population was 7,964.

SHAWL, shôl, a square or oblong cloth wrap worn loosely over the shoulders—among civilized nations chiefly by women. It is an ancient garment, as its simplicity would suggest. Many very old writers refer to it. The oldest shawls we have, and the finest, were made in Kashmir, where our most beautiful shawls are still made today, by methods used for many centuries. Even the patterns have changed very little. The fabric is woven from a very fine cashmere yarn made from the under wool of the shawl goat of the Himalayas.

The yarn, known as pashmina, which is in reality a fine thread, commands a high price in the market—$9 to $12 a pound. The dyes used are permanent. The patterns of the shawls are produced by weaving, and by embroidery. Where the design is to be embroidered the ground of the shawl is of a plain pashmina fabric. Very primitive looms are employed. Three or four men sometimes work at one loom, and for some of the finer shawls a year's time is necessary. The more ordinary shawls are produced about five a year, to each loom. Sometimes these shawls are woven in separate portions, and afterward joined together with great skill. Cashmere shawls sell as low as $70 or $80, but one of a first-class pattern and coloring will cost $1,200 to $1,500. Such a shawl will weigh about seven pounds and the texture will be very fine and close and the design intricate. About $150 will represent the cost of the materials used, $750 the labor expended and $600 the duty to be paid and other expenses. In the Punjab of India inferior shawls are manufactured at Nurpur, Amritsar and also in Kerman, Persia, the art having been carried over from Cashmere. The fine pashmina is mixed with the coarser goat's wool, called kaork. The finest shawls in Persia are also made of silk to resemble Cashmere shawls.

The production of shawls was until recent years a very important manufacture in France, and gave occupation to many in Paris, who not only furnished designs for those woven in their own country—chiefly at Paris, Lyon and Nimes—but also for shawl-manufacturers in England and Austria, and even for some woven in Cashmere. In 1867 it was estimated that the annual value of the French shawl trade amounted to nearly a million pounds sterling. At Paisley in Scotland, where for many years previous to 1860 the manufacture of shawls was of great importance, the trade originated in the beginning of the 19th century, and at its height occupied 8,000 looms. They were made of silk, wool or cotton, either separately or in combination; but the best-known class of Paisley shawls was manufactured of fine wool imitating Cashmere designs. Soon after the middle of the century the manufacture began to decline and has now ceased. Tartan shawls, however, chiefly of small size, for indoor or occasional wear, are still made at several places in Scotland.

SHAWNEE, shâ-nē′, city, Oklahoma, Pottawatomie County seat, alt. 1,080 feet; on the North Canadian River, which is not navigable; the Chicago, Rock Island and Pacific; the Atchison, Topeka and Santa Fe; and the Oklahoma City, Ada and Atoka railroads; by rail, 39 miles southeast of Oklahoma City. It has a commercial airport and is on modern highways. Situated close to the geographical center of the state, Shawnee is in a wide agricultural region producing diversified crops—principally cotton, corn, oats, alfalfa, peanuts, blackberries, potatoes, and pecans. It is the trading center for an extensive area which includes a number of smaller municipalities. Twenty-eight miles northeast is Tinker Air Force Base, employing many Shawnee residents. There are flour and feed mills, and cotton gins and compresses. Tents and awnings and electrical equipment are produced in the city's factories.

Educational and cultural interests center in public and parochial grammar schools and a public high school, a Carnegie library, daily and weekly newspapers (local and county), and several theaters. Shawnee is the seat of Oklahoma Baptist University and St. Gregory's College. St. Gregory's has a museum and an art gallery with some highly valued paintings. Average enrollment in the two colleges is 1,500. In 1940 Shawnee had a National Youth Administration school for training boys, and a Civil Aeronautics Authority training course in connection with the local airport and the Oklahoma Baptist University. There is a federal building. The city has an adequate system of parks, playgrounds, and recreational centers.

Located on lands originally belonging to the Shawnee tribe of Indians, the town was first called Shawnee Town. It was founded in 1895, and was incorporated in 1896. The city government is administered by a commission with a city manager. The water supply system, using surface reservoirs with a capacity of 7.4 billion gallons, is municipally owned and operated. When Oklahoma became a state, in 1907, Shawnee had a population of 10,955. Pop. (1940) 22,053; (1950) 22,948.

SHAWNEE INDIANS (contracted from the Algonquian *Shawanogi,* "southerners"), an important tribe of the Algonquian stock of North American Indians, who, according to the best evidence, were originally an offshoot from the Lenape or Delawares, which migrated southward, hence their popular name. It is believed that they entered the present limits of the United States from the territory north of the Great Lakes via the lower peninsula of Michigan, various bands or divisions settling in southern Illinois, southern Ohio and (the larger part) on Cumberland River. A portion of the latter drifted southeastward to the headwaters of the Savannah, where they came in contact with the Cherokees and Catawbas, who forced them northward into Pennsylvania by 1707, while those remaining on Cumberland River were driven away by combined Cherokees and Chickasaws. They were first mentioned under the name Ouchaouanag, in 1648, as living to the westward of Lake Huron; later in the century they were found by La Salle in northern Illinois, while others were settled along the Ohio and the Cumberland, and indeed had extended into Maryland, Virginia and Pennsylvania, and even as far south as Mobile, Ala., in the country of the Creeks. They were at war with numerous tribes at various periods, as well as with the French, and later with the United States, from the beginning of the French and Indian War until about 1795, during which time they had concentrated north of the Ohio River. Anthony Wayne's victory, followed by the Treaty of Greenville in 1795, terminated the hostilities of the Indians of the Ohio Valley region, a considerable part of the Shawnees moving to Missouri, within Spanish territory, while a few years later others migrated to White River, Ind., on invitation of the Delawares. Early in the 19th century, Tenskwatawa, the "Shawano Prophet," brother of the celebrated Tecumseh, preached a new doctrine the acceptance of which would open the way to future happiness and a return of the old order of things, not unlike the "Ghost Dance" religion which in-

volved so many of the Western tribes beginning with 1890. The Prophet gathered many adherents from far and wide, who established themselves at the mouth of Tippecanoe River, Indiana. To overcome their hostile demonstrations, General Harrison in 1811 led an expedition against them, resulting in the defeat of the Indians in the celebrated battle of Tippecanoe and the destruction of their settlement, while the tragic death of Tecumseh, their recognized leader, in the following year, tended to break their hostile spirit. The Shawnees of Missouri sold their lands to the government in 1825 and were assigned to a reservation in Kansas, but meanwhile a large number of them had departed for Texas where they settled on the headwaters of Sabine River until driven out in 1850. In 1831 the Ohio Shawnees ceded their lands to the United States and joined their kindred in Kansas, and in 1845 a large part of these Kansas Shawnees moved to the Canadian River in Indian Territory, where they soon came to be officially known as Absentee Shawnees. In 1867 the mixed Shawnees and Senecas who had moved from Ohio to Kansas about 1831, also migrated to Indian Territory, where they became known as Eastern Shawnees, and in the meantime the rest of the tribe joined the Cherokees in Indian Territory, with whom they are now incorporated. The Shawnees known as Black Bob's band are those who at first refused to move from Kansas with the others. There are also Shawnees among the Tuscaroras in New York, and others are incorporated among the Teton Sioux, while in 1840 a number of the tribe accompanied a party of trappers to the Tulare Valley of California.

The Shawnees were early described as of good stature, an active, sensible, cheerful people, full of laughter and drollery, courageous, high-spirited and manly, yet "the most deceitful in human shape." Each town had its headman. Polygyny was common and infanticide frequently practised. It was said that most of the Shawnees could speak several languages, due, no doubt, to their roving propensities when occasion required, although they were agriculturists in the main. The tribe had four phratral organizations, the members of which occupied different sides in the council-house during public assemblies. So far as known 13 gentes were recognized. Of the population of the Shawnees in early times there is no reliable information, the estimates ranging from 1,000 in 1736 to 2,000 in 1817. In 1910 the population of the Shawnee aggregated 1,338, of whom 1,300 were in Oklahoma. In 1926 there were 176 Eastern Shawnees on the Quapaw Agency in Oklahoma, and 565 Absentee Shawnees on the Shawnee Agency in the same State.

Bibliograpny.— Denny, E., 'Military Journal' (1860); Drake, B., 'Life of Tecumseh' (1855); Eggleston, E., 'Tecumseh and the Shawnee Prophet' (New York 1878); Hodge, F. W., 'Handbook of American Indians' (Washington 1907–10); Jones, D., 'A Journal of Two Visits Made to Some Nations of Indians on the West Side of the River Ohio in the Years 1772 and 1773' (New York 1865); Mooney, J., 'Ghost-dance Religion' (Washington 1896); Post, C. F., 'Two Journals of Western Tours' (1759); Thomson, C., 'Causes of the Alienation of the Delaware and Shawnee Indians from British Interests' (Philadelphia 1759).

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SHAYA ROOT, the root, or the plant itself, of *Oldenlandia umbellata,* of the madder family, and sometimes called Indian madder. It is a slender branching annual, with narrow opposite leaves, and small flowers in panicles. It grows wild, and is also cultivated, on the Coromandel coast, the outer bark of its roots yielding the well-known durable red-dye seen in Indian cotton goods. The leaves have been used as an expectorant in native medicine.

SHAYS, shāz, **Daniel,** American soldier, leader of the "Shays' Rebellion" in Massachusetts: b. Hopkinton, Mass., 1747; d. Sparta, N. Y., 29 Sept. 1825. He is first heard of as an ensign at Bunker (Breed's) Hill, was made captain 1 Jan. 1777 and resigned from the service. There is testimony that he was a good soldier. The rebellion of 1786–87, in which he was the directing figure, arose from a spirit of unrest and lawlessness then generally on the increase in the country, but more particularly from special reasons for dissatisfaction in Massachusetts. Among these were the wastefulness in the costs of litigation, the high salaries attached to public offices, and above all the exorbitant land taxation. The time was one of financial depression, and Governor Bowdoin in his endeavors to sustain the credit and diminish the debt of the State undoubtedly caused heavy burdens to fall upon poorer citizens inland. Sheriffs' and County Courts were kept busy. In the fall of 1786 five or six hundred malcontents, under command of Shays, gathered at Springfield, the purpose being to overawe the Supreme Court about to sit there and prevent the finding of indictments. After a three days' session the court adjourned. In November, when the Court of General Sessions attempted to sit at Worcester, Shays filled the courtroom with an armed force and no court could be held. Washington was deeply alarmed at the reports of these early successes of the insurgents. "It was but the other day," said he, "that we were shedding our blood to obtain the constitutions under which we now live — constitutions of our own choice and making — and now we are unsheathing the sword to overturn them." An army of 4,400 was now enlisted for 30 days by Governor Bowdoin, and the money for equipment and munitions was raised by a loan from wealthy citizens. The command was given to Gen. Benjamin Lincoln, a Revolutionary veteran. On 25 Dec. 1787 Shays, with 1,100 troops, made an attack on the Springfield arsenal, guarded by General Shepard with 1,200. Shepard at first commanded his men to fire above the insurgents' heads, but as the latter continued to advance in good order, a volley was directed into their ranks. Four fell, and the insurgents retreated in much confusion, continuing their flight, with many desertions, from town to town. Lincoln pursued them to Petersham, where on 3 February 150 were taken and the rest dispersed. The rebels continued to gather in small bands, for some months, but no large force again appeared. The greatest clemency was shown toward the leaders, and a very general amnesty

proclaimed. Shays removed to Vermont, was pardoned and went thence to Sparta, N. Y., where he obtained a pension for his Revolutionary services.

SHAYS' REBELLION. See SHAYS, DANIEL.

SHCHERBAKOV or **RYBINSK,** USSR, district and town in the Yaroslavl region, about 50 miles northwest of Yaroslavl, on the Volga, opposite the mouth of the Sheksna, which forms the first link in the waterway system constructed in the 19th century to establish direct water communication between the Volga and St. Petersburg (Leningrad). Shcherbarov is an important transshipment center, has an active grain and hemp trade, and manufactures printing presses, road machines, and ships. Near it two large hydroelectric stations were under construction when World War II broke out. Pop. (1939) 139,011.

SHE, a romance by Rider Haggard (1887), a young Englishman goes to Africa to avenge the death of an Egyptian ancestor, whose strange history has come down to him in an old manuscript. The ancestor, a priest of Isis had been slain by an immortal white sorceress somewhere in Africa. The sorceress, She, and the Englishman finally meet, recognize a mysterious bond between them and, at the climax of the story, visit a place where burns a mysterious fire which gives thousands of years of life, loveliness, strength and wisdom or else swift death. She for the second time passes into the flame and is instantly consumed.

SHE-OAK, any one of the small trees or shrubs of the peculiar genus (*Casuarina*) of oaks, native to the East Indies and Australia. Although closely related to oaks and walnuts, the she-oak has no true leaves, substituting whorls of long drooping, slender deciduous branchlets and is said to resemble both Scotch firs and giant horsetails, in its wide-spreading top. It casts but little shadow. The branchlets are acidulous in taste and are liked by cattle. A small and round fruit is called the she-oak apple and is of bitter taste and used to flavor beer. The wood of the she-oak is extremely hard, makes excellent fuel and is valuable for woodworking; in some species it is reddish, with light and dark streaks, and is called beefwood.

SHE STOOPS TO CONQUER. Though he was thoroughly a child of his time, it was Goldsmith's peculiar genius that he went to life for his influences rather than to books. The central feature of *She Stoops to Conquer* has some resemblances with Farquhar's *The Beaux' Stratagem,* but its veritable source was undoubtedly an episode in the youthful career of Oliver himself.

If in the theater Goldsmith seems to have been more of a reformer than elsewhere the reason is not far to seek. The refinements of that sentimental comedy which in his day controlled the stage were repugnant to him as an instinctive artist. Before his playwriting days Goldsmith had ridiculed "genteel comedy" and in the "low" passages of *The Good-Natured Man* had resolutely entered the lists against it. *She Stoops to Conquer* is the author's second and more successful play. Less artificial than the comedy of manners, to which general class it belongs, it has more of Fielding in it than of Congreve. No one but Goldsmith could have given such a view of a country house. And even the London characters are freshly viewed. Their city manners are crossed with the forthrightness of nature. Raillery and repartee dwindle in importance before character and atmosphere. The difference between Goldsmith and Sheridan was that the former knew life whereas the latter knew only the stage. Squire Hardcastle is drawn without a stroke of over-elaboration. Less sportive than Tony he digs as deeply into the memory; but Tony and his mother linger as something more than caricatures. Kate Hardcastle is as much a product of observation as Millamant of *The Way of the World* is a product of thought and Maria of *The School for Scandal* is a product of the stage. It is the veritableness of the atmosphere of the play that saves it from, what the plot would make it, sheer farce. Goldsmith was not fortunate in his relationships with Colman and Garrick, the two monopolists of the theater of his day. Yet upon its performance by Colman at Covent Garden Theater, March 15, 1773, *She Stoops to Conquer,* "succeeded prodigiously" (Walpole). It holds the stage in frequent revivals to this day. *Editions:* Masson, D., *Globe* edition (1869); Dobson, A., ed., Belles Lettres Series (1905); Temple Dramatists (1900); Everyman's Library (Vol. 415).

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SHEA, shā, **John Dawson Gilmary,** American historian: b. New York, July 22, 1824; d. Elizabeth, N. J., Feb. 22, 1892. His father was principal of the Columbia College Grammar School where he gained his education, and subsequently he studied law and was admitted to the bar in 1846. He soon turned to literature, was connected in an editorial capacity with Frank Leslie's publishing house and later edited the *Catholic News.* But for many years his attention was given to historical research in preparation of his *History of the Catholic Church in the United States,* the fourth volume of which was in process of publication at the time of his death. He was connected with many historical societies in America and Europe and was the first president of the Catholic Historical Society of the United States. His published works include *The Discovery and Exploration of the Mississippi Valley* (1853); *History of the French and Spanish Missions Among the Indian Tribes of the United States* (1854); *The Catholic Church in Colonial Days* (1883); *The Hierarchy of the Catholic Church in the United States* (1886); *Early Voyages Up and Down the Mississippi* (1862); *Novum Belgium, An Account of the New Netherlands in 1643–44* (1862); *The Operations of the French Fleet under Count de Grasse* (1864); *Life of Pius IX* (1875); *Story of a Great Nation* (1891), besides many translations and other works.

SHEAFFE, shēf, SIR **Roger Hale,** Canadian general and administrator: b. Boston, Mass., July 15, 1763; d. Edinburgh, Scotland, July 17, 1851. He was appointed ensign in the

British Army in 1778 and was promoted lieutenant in 1780. He served in Ireland (1781–1782) and in Canada (1787–1789). He was on active duty in Holland in 1789 and accompanied the expedition to the Baltic in 1801. He returned to duty in Canada in 1802, reached the rank of major general in 1811 and was on leave for a year. He was again on active duty in Canada in 1812–1813 and on Oct. 13, 1812 at the Battle of Queenston Heights he was in command of the forces that recaptured Queenston from the United States troops. He retained command of the British forces in Canada and administered the government of Upper Canada until 1813 when he was recalled to England. He rose to be a lieutenant general (1821) and a general (1828). He was knighted in 1813 in recognition of his services at Queenston.

SHEAR, shēr, **Cornelius Lott,** American plant pathologist: b. Coeymans Hollow, N. Y., March 26, 1865. After completing his college education Shear studied in Europe and in 1898 became a full-time assistant agrostologist in the United States Department of Agriculture. In 1901 he became assistant pathologist in the department, and principal pathologist in charge of mycology and disease of plants from 1925 to 1935 when he retired. He has held offices in many scientific organizations and his special research on cotton, grapes, cranberries, grass and forage plants is noteworthy.

SHEAR, Theodore Leslie, American archaeologist: b. New London, N. H., Aug. 11, 1880; d. Lake Sunapee, N. H., July 3, 1945. Except for a year in the American Army Air Force in World War I, Shear's life was devoted to archaeology and classical art. He conducted excavations at Cnidus (1911), Sardis (1922), and Corinth (1925–1931). A lecturer on art and archaeology at Princeton University (1921–1927), professor of classical archaeology from 1928, he was also curator of classical art in the museum of the American School of Classical Studies at Athens (1936–1942); director of the excavation of the Athenian Agora (1930–1942), and wrote articles for periodicals, and books on his discoveries.

SHEARD, shērd, **Charles,** American biophysicist and physiological opticist: b. Dolgeville, N. Y., May 27, 1883. After taking degrees at St. Lawrence, Dartmouth, Princeton, and Los Angeles colleges, Sheard began teaching in the New York public schools, then at Dartmouth and Ohio State colleges, becoming director of the division of physics and biophysical research at the Mayo Clinic from 1924 to 1949, when he became emeritus director. He was on the board of directors of the National Society for the Prevention of Blindness, and consultant to the United States Navy from 1947. He founded the Sheard Foundation for Education and Research in Vision at the graduate school of Ohio State University in 1943. His major fields of research have been in ocular refraction, effects of radiant energy on plant and animal tissues, and the visual problems of aviation. He published *Ophthalmic Optics* (1949) and *Problems of Binocular Vision* (1953).

SHEARMAN, Sir **Montague,** English judge and athlete: b. Wimbledon, England, April 7, 1857; d. London, Jan. 6, 1930. Becoming a barrister in 1903, Sir Montague presided at many famous murder trials. He was a noted rugby player and all around athlete, and president of the Amateur Athletic Association in 1915.

SHEARMAN, Thomas Gaskell, American lawyer and economist: b. Birmingham, England, Nov. 25, 1834; d. Brooklyn, N. Y., Sept. 29, 1900. Admitted to the New York bar in 1859, Shearman compiled a reference book on procedure, the first volume with John L. Tillinghast, the second alone, called *Practice, Pleadings, and Forms in Civil Action in the Courts of Record in the State of New York* (1861–1865), which was used until 1877, when the law was changed. As a partner in the law firm of David Dudley Field, he was concerned with lawsuits of the Erie Railroad. He withdrew in 1873 to form a new firm with John W. Sterling. He defended Henry Ward Beecher without pay in the suit brought by Theodore Tilton (1874–1875), was counsel for Jay Gould and James J. Hill, and often gave his services to indigent clients. Perhaps best known for his support of Henry George and the single tax (a name Shearman invented), he wrote *Natural Taxation* (1895) which advocated a single tax on ground rents. See also Single Tax.

SHEARS. See Cutlery; Hardware Industry.

SHEARWATER, one of several sea birds of the family Procellariidae which consists of the petrels, fulmars, and shearwaters. These and the related but much larger albatrosses form an order of birds, the Tubinares or tubenoses, so called because of their tubular nostrils. They are strictly maritime and occur throughout the oceans or other large bodies of salt water such as the Mediterranean and the Gulf of California. They come to land only for nesting, some species remaining continuously at sea for periods of six to nine months. The shearwaters are larger than the petrels and differ from them and the fulmars by having a longer and more slender bill and longer and narrower wings. They get their common name from the manner in which they glide over the sea with stiff wings to skim the surface for particles of food, alternately rising, banking, and plunging steeply downward with perfect mastery even during the fiercest gales. The better known shearwaters are perhaps the Greater (*Procellaria gravis*), the Sooty (*P. grisea*), and the Manx (*P. puffinus*) which is less pelagic than the others, frequenting chiefly offshore waters.

SHEATHBILL, a bird of the family Chionididae consisting of only two species that inhabit the southern end of South America and the islands off the Antarctic continent. They have the general appearance and flight of a pigeon but are believed to be related to the shore birds. Sheathbills are all white with a small bare patch of skin on the face and have the base of the upper bill covered by a horny sheath, hence their common name. They are omnivorous, bold scavengers and are said to be fearless of other animals including man.

SHEBA, shē'bà, or **SABA** (Arab. Saba'), ancient country of Biblical times, Arabia, probably including modern Yemen and Hadhramaut, although its precise site has not been determined. It was a great commercial center of the Semitic tribes. The Sabaeans carried on an extensive trade with India, Europe, Egypt, and Syria, in frankincense, gold, ivory, ebony, textiles, sweet spices, and for

this purpose had depots in northern Arabia and Ethiopia. Their wealth became famous in the Orient and their queen paid a visit to Solomon bearing rich gifts, according to the story in I Kings 10:1 fol. A late Arabic version identifies her as Balkis, but asserts that Solomon visited her at Yemen where she tested him with many riddles.

The Sabaeans worshiped the sun and the moon. In the 8th century they were subject to the Assyrians; in 24 B.C. the Romans sent an unsuccessful expedition into their territory and in the 2d, 4th and 6th centuries they became subject to the Ethiopians.

SHEBOYGAN, shē-boi'găn, city, Wisconsin, and Sheboygan County seat, altitude 589 feet; on Lake Michigan, at the mouth of the Sheboygan River; on Chicago and North Western Railroad; by rail, 52 miles north of Milwaukee. There are Great Lakes steamship connections and an airport. Sheboygan is a port of entry, Customs District 37; its harbor is open all year. The city is a lake fishery center, and a shipping point for millions of pounds of cheese annually produced in the county. Its principal industries and manufactures are furniture; enamelware, plumbing and heating equipment, shoes, toys, knit goods, gloves, machinery, boxes and crates, metal fabrication, and other items in a well diversified list. These activities reflect the nature of the city's environment, with Lake Michigan on one side and wooded lands and farmlands on the other, supplying lumber and dairy products.

Sheboygan has 12 public elementary schools, 11 parochial schools, two high schools, and a junior high. There is also a business college. The city has 15 parks, large and small, supervised playgrounds, and a recreational center maintained by the Y.M.C.A., and a service club; also a natural "bowl" or amphitheater. There are 45 churches and two hospitals. In addition to the usual civic and social organizations, the city has a number of musical organizations: the Civic Music Association, the Civic Symphony, the Sheboygan Music Club, the A Cappella Choir, and the municipal band.

History.—The city's name is held to be from Indian words meaning "send through, drum." In 1820 a trading post was set up near the mouth of the Sheboygan River. Incorporation as a village occurred in 1846, and Sheboygan was chartered as a city in 1853. In 1845, when Fourierism (q.v.) flourished in parts of the United States, the Wisconsin Phalanx was established near Sheboygan. It broke up in 1848. While it lasted, it was, after Brook Farm, one of the most important American phalanges. Sheboygan has the mayor and councilmanic form of government. There is an excellent public library. The water supply system and sewage disposal plant are municipally owned. Pop. (1950) 80,631.

SHEDD, shĕd, **William Greenough Thayer**, American theologian: b. Acton, Mass., June 21, 1820; d. New York, Nov. 17, 1894. He was graduated from the University of Vermont in 1839, from Andover Theological Seminary in 1843 and in 1844–1845 was pastor of the Congregational Church in Brandon, Vt. He was professor of English literature in the University of Vermont in 1845–1852, of sacred rhetoric and pastoral theology at Auburn Theological Seminary in 1852–1853 and of ecclesiastical history and lecturer on pastoral theology at Andover in 1853–1862. He acted as assistant pastor at the Brick (Presbyterian) Church, New York, in 1862–1863, was appointed to the chair of Biblical literature at Union Theological Seminary, New York, in 1863, and in 1874 was transferred to that of systematic theology, which he occupied until 1890.

His publications include: *The Method and Influence of Theological Studies* (1845); *The True Nature of the Beautiful and its Influence upon Culture* (1851); *The Nature and Importance of Natural Rhetoric* (1851); *Lectures on the Philosophy of History* (1856); *A History of Christian Doctrine* (1863); *Homiletics and Pastoral Theology* (1867); *Sermons to the Natural Man* (1871); *Theological Essays* (1877); *Literary Essays* (1878); *Commentary on St. Paul's Epistle to the Romans* (1879); *Sermons to the Spiritual Man* (1884); *Doctrine of Endless Punishment* (1885); *Dogmatic Theology* (1889–1894); *The Proposed Revision of the Westminster Standards* (1890), etc.

He also published *Eloquence a Virtue, or Outlines of a Systematic Rhetoric* (1850), a translation from the German of Dr. Francis Theremin; *A Manual of Church History* in two volumes, translated from the German of Heinrich Ernst Ferdinand Guericke (1857); edited seven volumes of Coleridge's works, with *Introductory Essays* (1853); *The Confession of Saint Augustine*, with introductory essay (1860); and wrote introductions to Asbury's translation of Ackerman's *The Christian Element in Plato and the Platonic Philosophy* (1860) and to McCosh's *Intuition of the Mind* (1864).

SHEE, shē, Sir **Martin Archer**, English painter: b. Dublin, Ireland, Dec. 23, 1770; d. Brighton, England, Aug. 13, 1850. He was introduced in 1788 to Sir Joshua Reynolds by Edmund Burke, and in the same year became a pupil in the Royal Academy, to the exhibition of which he contributed his first picture in 1789. Although by no means the best portrait painter of his time, he was, with one or two exceptions, the most fashionable. In 1800 he was chosen a member of the Royal Academy, and in 1830, on the death of Sir Thomas Lawrence, he was elected president and knighted. He also aspired to literary distinction and in 1805 and 1809 published two parts of a poem entitled *Rhymes on Art*, in 1814 *The Commemoration of Sir Joshua Reynolds, and other Poems*, which called forth the praise of Byron, in his *English Bards and Scotch Reviewers:*

> "And here let Shee and genius find a place,
> Whose pen and pencil yield an equal grace;
> While honors, doubly merited, attend
> The poet's rival, but the painter's friend."

Among his portraits are those of William IV and Queen Victoria; all his work is pleasing, but there is an unpleasant tendency to unnatural redness in his flesh tints. The National Portrait Gallery contains numerous examples of his works.

SHEEDY, shē'dē, **Morgan M.**, author, lecturer, priest: b. Liscarroll, County Cork, Ireland, Oct. 8, 1853; d. Altoona, Pa., Oct. 25, 1939. His mother, Mary (Madden) Sheedy, was a member of a family which has given many priests and distinguished writers to the world. He was educated at St. Colman's College, Fermoy, and at the College of Maynooth; received degree of LL.D. from Notre Dame Uni-

versity, Indiana, and Mount Saint Mary's, Maryland. Ordained in the Pittsburgh Cathedral by the late Bishop Tuigg, 23 Sept. 1876; assigned as professor of theology and history at Saint Michael's Seminary, where he continued until the institution was closed. First president of the Catholic Summer School of America and director of the Reading Circle Union; vice-president of the Catholic Total Abstinence Union for four years. Founder of the Pittsburgh Polytechnic Society. He lectured for the Academy of Science at the Champlain Summer School and the first session of the Catholic Winter School in New Orleans. Since 1894 permanent rector of Saint John's Church, Altoona, Pa. Editor of *The Quarterly* and a frequent contributor to the Catholic press and magazines, the *Catholic World,* The *American Ecclesiastical Review,* etc. Author of 'Briefs for Our Times'; 'Social Problems' (dealing with the labor question); 'Christian Unity,' etc.

SHEEHAN, shē'ăn, **Patrick Augustine,** Irish Roman Catholic canon and novelist: b. Mallow, County Cork, 17 March 1852; d. 6 Oct. 1913. He was educated at Maynooth College and was ordained in 1875. He held various curacies until 1895 when he became parish priest of Doneraile, and in 1903 he became also canon of Cloyne. He was known as a writer of essays, poems and novels, all of which are characterized by an intimate knowledge of Irish life and permeated with a strong Roman Catholic bias. Author of 'Under the Cedars and Stars' (1903); 'The Triumph of Failure' (1899); 'My New Curate' (1900); 'Early Essays and Lectures' (1906); 'The Blindness of the Rev. Dr. Gray' (1909); 'The Queen's Fillet' (1911); 'Graves at Kilamorna' (1915), etc.

SHEEP. The sheep (genus *Ovis*) belongs to the family of ruminants termed Bovidæ, of which the ox (*Bos*) is a typical representative. Other animals such as the goat, musk-oxen, chamois and antelope belong to the same family but the sheep represents a distinct genus for which the name *Ovis* has been adopted, and, as a species, the domesticated sheep has been given the name *Ovis aries.*

Sex and Age Names.— The male sheep is known as a *ram* or *buck.* The term buck, however, is not regarded as good usage, but it is almost universally applied to male sheep in the western part of the United States. The female sheep is known as a *ewe* and the unsexed male as a *wether.* From birth until the age of 12 months is attained the young of sheep are called lambs; from 12 to 24 months of age they are called yearlings; from 24 to 36 months, two-year olds, et cetera.

How to Determine the Age of Sheep.— Until sheep become four years old their age can be approximated by their teeth. The temporary or lamb teeth, 20 in number, are small; the permanent teeth, of which there are 32, are broader and longer. As a rule the two temporary teeth in the middle of the front part of the lower jaw are replaced by permanent teeth when the animal is about 12 months old and two more appear each year until at four years of age all of the front teeth are permanent, making what is called a full mouth. Therefore, a sheep showing two broad teeth in front is called a yearling; one showing four broad teeth, a two-year old; one showing six such teeth, a three-year old. Beyond the fourth year it is not possible to approximate age except in a very general way, but the teeth of a very old sheep are likely to be spread apart, missing or they may be worn down short. Other indications of advanced age are a sunken appearance over the eyes, comparatively short wool that is more or less uneven in length and a tendency toward emaciation.

Habits.— Sheep are ruminants and while they are fond of concentrated feeds they must have bulky feeds such as grass and hay. They eat all of the grasses except the very coarsest varieties and they are very fond of the cultivated leguminous plants. They eat most of the weeds common to the farms and ranges of the United States and they will feed on young tree-growth more than any other domestic animal in America except goats.

Sheep like an extensive range and comparatively short herbage. Because of their mobile lips and sharp incisor teeth they are structurally adapted to feeding on short grass. They enjoy changing from old to new pastures and they delight in feeding on the high places more than they do on the low places in their pastures. Sheep are able to exist without water longer than most domestic animals, but nevertheless they should have free access to it. Even in cold weather they will drink from two to four quarts daily. They prefer running water to still water.

In seeking a bedding-place sheep prefer relatively high ground where there is good air and water drainage. It is only in the severest periods of storm that they abandon such a place for a lower, wind-protected location. Young sheep seek high places more readily than do older ones; yearlings will feed high up on a hillside more readily than old ewes.

Breeding Habits.— Most domesticated breeds produce offspring but once a year. In the United States the mating is in the autumn, because it is at this time that the nights turn cool and this seems to have a marked influence in causing the ewes to come in heat (œstrus). The normal gestation period for ewes is about 146 days. Ewes commonly give birth to one or to two lambs. Occasionally triplets are born and in rare instances four or more. But since the female sheep has only two teats, breeders do not desire more than two lambs to each ewe.

Gregariousness.—All sheep possess the flocking instinct, but it is more pronounced in some breeds than in others. This instinct is of great importance in regions where sheep are herded on rough unfenced range, and a breed of sheep must be kept that possesses it in the most marked degree. When a sheep is separated from the flock it is an indication that it is either lost, ill or injured.

Closely associated with the gregarious instinct is the instinct to follow a leader. "Where one sheep goes all others will follow" is literaly true even though it involves a long leap or a plunge into the water.

No other domestic animal is so timid and so unable to defend itself as the sheep. On this account it is a subject of prey for such animals as the wolf, coyote, dog, bobcat and mountain lion. In all countries where sheep are kept there are predatory animals of the canine and feline groups that harass sheepmen by the attacks they make upon their flocks.

Types.— Sheep were probably first domesti

Karakul ram.

Merino ewe.

SHEEP

(Bottom left) Straight Furrow photo; (others) U.S.D.A. photos

Cheviot ram.

Border Leicester ram.

Corriedale ram.

Romney ram.

Scottish blackface sheep.

Southdown ram.

(Top left) courtesy Wool Bureau; (others) U.S.D.A. photos

Lincoln ram.

Suffolk ram.

Oxford ram.

Hampshire ram.

cated on the high, treeless plateaus and mountains of Turkestan, Asia, but they have been adapted to all sorts of climatic conditions and to all types of soil. Under the influence of not only soil and climatic conditions but of economic and social conditions as well, different types of sheep have been developed. At the present time most of the improved sheep may be roughly grouped under two types; one known as the fine wool type, the other as the mutton type. As these type names infer, there are sheep that have been developed primarily for their wool and others primarily for their mutton. In certain restricted areas of the world, notably in Europe and Asia, emphasis has been placed on the dairy qualities of sheep and in Asia there are types whose value depends chiefly upon the fur-like nature of their hairy covering, the lambskins of which yield what are known as the Persian, Astrakan, Broadtail and Krimmer furs.

The wool type of sheep was developed in Spain and it is known the world over as the Merino. For a long time Spain denied these sheep to the remainder of the world, but at the close of the Napoleonic wars she was no longer able to retain her monopoly on them and they were rapidly distributed in other countries. Before this time, however, the king of Spain gave permission for some of these sheep to be sent to a few other European countries and Saxony in Germany had demonstrated that they could be successfully raised outside of their native home. Consequently there was great demand for them when they became available to all countries. Germany, the United States and Australia specialized in them and made them better than they had been at home.

In the United States, the Merino was first called the Spanish Merino. But various strains that had been kept separate and distinct in the native home were mingled in America. This together with different ideals in breeding soon resulted in a modified type which was first called the Vermont Merino and later the American Merino.

American Merino breeders aimed at great weight and fineness of fleece. In order to get weight, large wrinkles and folds were developed in the skin. A maximum density of wool fibres on the surface of the skin was sought after; an attempt was made to grow wool on all parts of the body and on the face and legs as well and the greatest amount possible of yolk (a combination of the perspiratory and fatty secretions from the skin) was secured. Very little attention was given to mutton properties.

This kind of sheep satisfied earlier conditions in the United States because wool was almost the sole product from flocks in regions west of the Alleghany Mountains. There was no object in producing mutton, for transportation facilities were undeveloped. If they had been developed the population of the country was too small to justify a large production of mutton and facilities for exportation were inadequate. This situation, together with the fact that no other sheep has the gregarious instinct so intensely developed and hence is not as suitable as the Merino on expansive, unfenced ranges, explains why the Merino has always been the popular sheep in new countries and why they were adopted not only by the United States, but also by New Zealand, Australia, the Argentine and South Africa.

But as demand for mutton increased in the United States because of the increase in population and as transportation developed so that this demand could be met, changes became necessary in Merino breeding. There was also a change in the style of cloth which demanded the production of longer wool — a wool at least two and one-half inches in length so that it could be spun into worsteds. As a result strains were developed that grew longer wool and produced more meat.

At present there are three types of American Merinos known as the A, B and C types The A type is extreme in skin folds and wrinkles, density of fleece and yolk in the wool. It is what might be called an ultra wool type. The C type or Delaine is almost free from folds and wrinkles, and its wool is not so dense, has less yolk and is longer than that of the A type. It is wider, thicker and heavier and altogether much more suitable for mutton than the A type. In practically all respects, the B type is intermediate between the A and C types. Most Merino rams have horns, but the ewes are hornless. Rams weigh from 130 pounds to 200 pounds and their weight of fleece in the grease (i.e., weight just as it comes from the sheep) ranges from 25 pounds or more in the A type to 15 pounds or more in the C type. Ewes weigh from 90 to 150 pounds and they shear from 15 pounds up in the A type to 10 pounds up in the C type.

Australian Merinos differ from American Merinos mainly in the nature of their wool. The Australian breeders have bred for long, fine wool and not for excessive yolk as have the American breeders, who have specialized in the A and B types.

In 1786 the French government began growing Merinos, having for its object a combination of mutton and wool. A number of years later some of these sheep were taken to Germany. In both countries a large, thick sheep was developed. Importations were brought to the United States as early as 1840 but they did not attain popularity until toward the close of the century. They are now known as the Rambouillet, and in the United States they outnumber all other Merinos combined. Rams weigh from 225 to 250 pounds; ewes from 140 to 170 pounds. Rams yield from 15 to 25 pounds of grease wool; ewes from 10 to 18 pounds.

The Mutton Type.— England is the native home of the mutton type of sheep. This type was intensely developed by Robert Bakewell who began his work about 1760. Prior to his time there were two general types of sheep in England. One of these was a large, coarse sheep that grew long, coarse wool and yielded a fleece weighing from 7 to 12 pounds. These sheep were kept principally on the low fertile lands of Lincoln, Leicester and on the hills of Gloucester. It was with these sheep that Bakewell accomplished his work and he founded the breed known as the English Leicester.

The other type common to England was much smaller, better able to travel, and was suited to the hills and lighter soils. It produced short, rather fine wool and yielded fleeces weighing from two to five pounds.

Following Bakewell, there was a great era of mutton improvement brought about by careful selection in some cases, by crossing and selection in others. From the lowland sheep the Longwool mutton breeds have been developed, namely, the Leicester, Cotswold, Lincoln, Romney Marsh and others.

All of the long wool breeds strongly resemble each other; they are large, up-standing sheep with white faces and legs. Their wool is coarse and long, ranging from 8 inches in Leicesters to more than 12 in Lincolns.

From the smaller, lighter shearing type, the medium wool mutton breeds have come. In this group the most prominent in America are the Down breeds such as the Southdown, Shropshire, Hampshire, Suffolk and Oxford Down. The Oxford Down, however, is a cross between the Hampshire, a medium wooled breed, and the Cotswold, a long wooled sheep. The Down breeds have dark faces and legs — the darkest being the very deep brown of the Hampshire and Suffolk, and the lightest, the light grayish brown of the Southdown. The Southdown is regarded as the best improved breed in mutton qualities, but in this respect it is closely approached by the other Down breeds. Of the Down breeds, the Southdown has the shortest, lightest fleece, while the Oxford Down has the longest fleece.

There are numerous other medium wool breeds, the most prominent in the United States being the Dorset Horn and Cheviot, which differ from the Down breeds in that they have white faces and legs. Both the males and females have horns in the Dorset Horn breed.

Approximate Body and Fleece Weights of the Mutton Breeds Prominent in the United States.

BREED	Body weight		Weight of fleece, pounds
	Rams	Ewes	
Longwools			
Leicester	250	185	12
Cotswold	300	200	14
Lincoln	325	225	15
Romney Marsh	275	200	12
Medium wools			
Southdown	185	145	7
Shropshire	225	170	9
Suffolk	250	180	8
Hampshire	275	200	9
Oxford Down	285	200	11
Dorset Horn	275	190	7
Cheviot	175	140	7

When refrigeration and transportation developed to the point where it was possible to ship sheep or their carcasses from outlying points to the centres of dense population there arose a demand for the mutton breeds in all countries where improved flock husbandry is practised. In some regions the mutton breeds have replaced the Merinos, but in many others where some Merino blood is indispensable, they have been crossed with the Merino to effect mutton improvement. Breeders in New Zealand by crossing the Longwool breeds on the Merino secure a blend that represented what was needed. Then they bred the cross-bred animals together and thereby in time fixed a new type which is known as the Corriedale. Some of these sheep have been imported to the United States, and crosses between the Longwools and Rambouillets are being made in this country with a view to producing a desirable type of sheep for the intermountain region.

Types of Sheep Raising.— There are two general types of sheep raising. One involves keeping relatively large numbers on an extensive range; the other in keeping comparatively small flocks on farms where diversified agriculture is practised.

The first, generally known as the range method, is followed in the intermountain regions of the United States and Canada, in South America, South Africa, Australia, New Zealand and parts of Asia. Under this method in the United States the sheep are kept in the care of a herder on unenclosed land in bands containing from 1,500 to 3,000 head. The herder requires the whole or part time assistance of a camp tender, whose duty it is to get provisions, and move camp after selecting a new site where there is sufficient pasture; he also assists in cooking, and in counting the sheep. In winter the sheep are kept on the semi-arid plains; in spring and fall in the foot-hills, and in the summer in the national forests on the mountains. It is now customary to supplement the feed on the plains with grain and hay during severe periods in winter. All of the hay and some of the grain are grown on dry farms and irrigated land in the West. The remainder of the grain is shipped in from the Middle West and South. Australia and New Zealand have modified the range method by fencing in vast areas of land. As a result the sheep do not require a herder; they can feed according to their own inclination and hence thrive better than do sheep under a herder's care.

The keeping of small flocks on farms, known as the farm flock method, is practised in the central and eastern parts of the United States, eastern Canada, Great Britain and various other European countries. Flocks vary in size from a few head up to several hundred. As a rule farm flocks share their pastures with other classes of livestock, but in England they are often fed on quick-growing forages between hurdles. This constitutes an intensive method of handling and results in rapid growth, high finish and altogether a very superior mutton product.

Farm flocks are usually kept in regions where the climate is variable and hence special provision has to be made for feeding in winter and for sheltering in rainy and cold weather. Stored grain and roughages must be provided for. Of the grains, oats, corn, kaffir, barley and speltz are all suitable, but everything considered, oats are regarded the best for all but fattening sheep. The legume hays such as clover, alfalfa and soy beans are the best roughages, but good use can be made of corn silage and corn stover. In fact corn silage supplements splendidly with the legume hays. Some use can be made of oat and wheat straw as roughages, but they should be used in connection with the legume hays.

In northern United States, Canada and Great Britain, roots, such as Swedish turnips and Mangel wurtzels, are extensively used as feed for sheep. Being succulent they are valuable as a supplement to grain and hay.

Sheep require shelter chiefly as a protection from precipitous weather. Exposure to cold rains is especially damaging to them, particu-

larly if their wool becomes wet to the skin. Shelter is also needed if the weather is cold when the lambs are born.

Lambs are decidedly more popular than sheep as a meat product in the United States. The lambs are sold when they are from 4 to 10 months old and at live weights ranging from 65 to 90 pounds. Lambs are popular because they are toothsome and yield the size of chops and roasts most desired by American consumers.

From the standpoint of numbers and improved methods of breeding and feeding, the leading sheep countries of the world are Australia, New Zealand, United States, Argentine, South Africa and Great Britain. There are a great many sheep in Europe and Asia, but outside of a few European countries they are not well improved.

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SHEEP, Mountain, a general term for the wild sheep of the world, which collectively form a group of romantic interest, and scientific importance. Excepting their perpetual rivals, the wild goats and ibexes, they are, of all land animals, the boldest and most active rock climbers, and the most partial to mountain scenery. Wherever found, they inhabit the highest and most rugged and picturesque situations. Strange as it may appear, the haunts of the Rocky Mountain big-horn include not only our loftiest mountain ranges and many wild tracts of "bad lands," but also the rocky walls of the great abyss known as the Grand Cañon of the Colorado. It is not strange, therefore, that all big-game hunters who love grand scenery find great fascination in the chase of wild sheep. No man worthy of the name of sportsman ever kills a ewe, but the head of an old ram, adorned with massive circling horns, won by dangerous mountain climbing and fair stalking, is a trophy of which any man may justly be proud.

It seems highly probable that the first wild sheep were developed in south-central Asia, in the region of the Altai Mountains, western Mongolia. At all events, the favorable conditions there obtaining have developed the great Siberian argali (*Ovis ammon*), whose enormous horns are a perpetual wonder to all who behold them. Near by in the Siar Mountains is found the Siar mountain-sheep. A comparatively short distance southward in Tibet is the Marco Polo sheep (*Ovis poli*), characterized by the enormous spread of its horns. A pair of horns of *Ovis poli* owned by Lord Roberts had a spread between tips of 54½ inches, and the longest horn measures 75 inches in length on the front curve. Southward of the range of the *Ovis poli,* in northern India, occurs the Punjab wild sheep, and the beautiful burrhel or blue sheep, both of them small species. Southwestward of Asia only two wild sheep are found, the small but handsomely colored mouflon of Corsica and Sardinia, and the large Barbary wild sheep or aoudad of the mountains of the Barbary states of North Africa. Northward from the home of *Ovis ammon* we find the Kamchatkan sheep, a species with horns like our white sheep, but otherwise exhibiting a strong resemblance to our big-horn. And this brings us to Bering Strait.

North America contains a really fine series of mountain-sheep species almost covering the mountainous regions of Alaska, and extending down the Rocky Mountain system to the region of Lake Santa Maria (lat. 30°) in northern Mexico. In addition to this, a species known as Nelson's mountain sheep branches off in southwestern Nevada, extends through southern California and on down the peninsula of Lower California for two-thirds of its length. The total area of North America inhabited by mountain sheep is about 3,500 miles long from north to south, and its greatest width from east to west, which is found in Alaska, is more than 1,000 miles. Of North American mountain-sheep, there are three conspicuous and well-marked types, and three offshoots. When diagrammed in a manner calculated to appeal to the eyes they stand as follows:

TYPES	OFFSHOOTS
Big-Horn (*Ovis canadensis*)	Nelson's Sheep (*Ovis nelsoni*) Mexican Sheep (*Ovis mexicanus*)
Black Sheep	(*Ovis stonei*)
White Sheep (*Ovis dalli*)	Fannin's Sheep (*Ovis fannini*).

The Rocky Mountain big-horn (q.v.) has been known since 1803, and is our most widely known species. All the others are of recent appearance, only the white sheep dating back as far as 1884. The range of the big-horn extends from lat. 55° and long. 120° to San Francisco Mountain, Arizona. It embraces the whole main range of the Rockies between those points,

and also includes the Fraser River country, one locality in northern Washington, two in eastern Oregon, the counties of Custer and Dawson in Montana, the Black Hills and Bighorn Mountains of Wyoming, four localities in Utah, and the Grand Cañon of the Colorado.

This is the largest and heaviest species of our *Ovis,* and carries the most massive horns. It reaches its maximum development in the main range of the Rocky Mountains in western Alberta. A large ram stands 40 inches in height at the shoulders and weighs about 325 pounds. Horns that measure 16 inches in basal circumference may justly be called very large. The largest and longest on record measured 18½ inches in basal circumference, and 52½ inches in length on outer curve, but the genuineness of this pair of horns is now doubted. One of the largest pairs in existence measures 16½ inches in basal circumference, 40½ inches in length and weighs 38 pounds. Apparently the horns of a mountain-sheep grow as long as the wearer survives in a healthy condition.

Wild sheep are not covered with wool like domestic sheep. Next to the skin is a coat of fine woolly hair, which is for warmth; but through this grows a coat of long, coarse hairs, large in diameter, pithy within and easily broken. This does duty as a rain-coat, and it also gives the animal its distinctive color. In summer, or late spring, when the old pelage is shed, the new coat is only half an inch in length, and the wild sheep stands forth fully sheared by the hand of nature. At that season the skin is worthless as a trophy. Mountain-sheep are at their best in October, November and December, and should be hunted at no other time. The lambs are born in May, and usually there is but one at a birth. Owing to the practical impossibility of keeping mountain-sheep of any American species alive in captivity, anywhere east of the Great Plains until they reach full maturity, our members of the genus *Ovis* are but little known to the general public, and consequently are quite unappreciated at their true value.

The white mountain-sheep of Alaska was not introduced to the world until 1884. It inhabits nearly all the mountainous regions of Alaska except the Alaska Peninsula, the valley of the Kuskoquim and the lower valley of the Yukon. Until recently it has been quite abundant on the Kenai Peninsula and around the head of Cook Inlet. This animal is all over pure white, and its winter pelage is long and abundant. It is smaller than the big-horn, and its horns never exceed 15½ inches in circumference. Northward its range extends almost to the Arctic Ocean, and its southern limit is found at lat. 58°. In 1901, the New York Zoological Society sent a collector to Cook Inlet to capture newly-born lambs of this species, and bring them to New York, for acclimatization in the Zoological Park. Three lambs were captured, but they proved to be such delicate feeders that all died within a few days of their capture.

The black mountain-sheep was discovered in 1896 in northern British Columbia, and good representatives of this species are to be seen in the museums of New York, Chicago and Washington. The size of the black sheep is the same as that of *Ovis dalli.* The species is characterized by the wide spread of its horns, and the very dark color of its pelage, all except the white of the rump-patch and the abdomen. So far as known the range of this species is very circumscribed, for it has not been reported outside of a small area in northern British Columbia.

Fannin's mountain-sheep, often called the "saddle-backed sheep," was discovered on the Klondike River near Dawson City in 1900. It is an offshoot of the white sheep, and may possibly be the result of cross-breeding between that species and the black sheep. Its back, sides and tail are bluish gray, and a brown band extends down the front of each leg; but all other parts of the animal are pure white. Its horns are like those of the white sheep. But little is known of the range of this species.

The Mexican sheep and Nelson's sheep are both offshoots of the big-horn. They are short-haired and large-horned, and their prevailing color is pale salmon gray.

Wherever they are not fully protected by law, all species of American mountain-sheep are sought for and killed, by hunters for sport, and by natives for food. The total number remaining is small, and it is impossible for the survivors to be protected too rigidly. The big-horn quickly learns the value of protection, and the herd in the Yellowstone Park has rapidly increased and become so tame that it permits visitors to approach within 30 paces. Consult Baillie-Grohman, 'Camps in the Rockies' (London 1882); Grinnell, G. B., 'Hunting at High Altitudes' (New York 1913); Hornaday, W. T., 'Campfires on Desert and Lava' (New York 1908); id., 'Our Vanishing Wild Life' (New York 1913); Lyddeker, 'Wild Oxen, Sheep and Goats' (London 1898); id., 'Fifteen Years' Sport and Life in Western America' (London 1900); id., 'The Sheep and Its Cousins' (London 1912); Mayer (ed.), 'Sport With Gun and Rod' (New York 1883); Roosevelt, T., 'Hunting Trips of a Ranchman' (New York 1885); Stebbing, E. P., 'Stalks in the Himalaya' (London 1912); Whitney, C., and others, 'Musk-Ox, Bison, Sheep and Goats' (New York 1904).

SHEEP-BOT, a bot-fly (q.v.) whose maggots produce the disease of sheep called "grub in the head." See Bot-Fly.

SHEEP-DOG. See Collie; Dog.

SHEEP-EATERS. See Shoshonean Indians.

SHEEP-LAUREL, or **LAMB-KILL,** the *Kalmia* or mountain-laurel (q.v.), which is poisonous to lambs and other small animals.

SHEEP TICK. See Ticks and Mites.

SHEEPSHEAD, the name of an important food fish (*Archosargus probatocephalus*) of the family *Sparidæ.* It is a stout, deep-bodied fish, with seven or eight vertical dark bands, and may attain a length of 2½ feet and a weight of 15 pounds. It receives its name from the resemblance of its teeth to those of a sheep, having incisor-like ones in the front of the mouth and molars behind. It is found along the coast from Cape Cod to Texas and is abundant locally and especially southward wherever the conditions are favorable. Like the drumfish, the sheepshead feeds chiefly upon hard-shelled mollusks and crustaceans, and large numbers congregate where such food is

plentiful and often prove destructive to oyster-beds. For boiling and similar methods of cooking it is considered superior to any fish in our waters, and consequently has a considerable commercial importance. The sheepshead is also a great favorite with anglers, many of whom are attracted to Florida fishing grounds in its pursuit. They are captured on extra stout lines and hooks baited with clam or soft-shelled crab and usually make a gallant fight before being finally landed in the boat. The freshwater drumfish is also called sheepshead.

Consult Jordan, David Starr, *American Food and Game Fishes* (1902); LaGorce, J. O., *The Book of Fishes, National Geographic Society* (Washington, D.C., 1952).

SHEERNESS, shēr-nĕs, urban district, England, County of Kent, on the Medway River where it joins the Thames, 35 miles southeast of London. It is strongly fortified and has an excellent harbor. There are spacious dockyards, used for making repairs, and which employ very many hands. The barracks accommodate several thousand soldiers and sailors. Sheerness-on-Sea is the modern town bordering the shore; the other divisions are Marinetown (a summer bathing resort), Miletown and Bankstown. Sheerness has a fine beach, broad esplanades and splendid bathing and boating. Charles II established the first dockyard here. In 1667 the town was captured by the Dutch admiral De Puyster. Pop. (1951) 15,727.

SHEERS, an engine used for hoisting masts and spars in shipbuilding and rigging. It consists of two or more poles or spars fastened together near the top and having their lower ends apart, somewhat in the shape of a narrow A. The apparatus is raised on a slant and is steadied by guy ropes, the base being fastened to the dock or ship on which it is used. From the top depends the tackle necessary for hoisting. Sheers are used on ships, docks and about shipyards for lifting heavy weights, guns, boilers or other machinery, spars and masts. When a mast is to be stepped or to be taken out, the sheers are mounted straddling the ship with the two base ends lashed to the deck on either side and the whole structure slanting so that its top is over the mast to be lifted or over the place into which it is to be dropped.

SHEET, generally speaking, a broad, flat surface; specifically a large stretch of water or ice; a large flat portion of some substance whose thickness is insignificant compared to its length and breadth, as a sheet of metal, of cardboard, etc.; a large rectangular piece of linen or like material used to cover the body during sleep, and thus a portion of the clothing of a bed; as applied to stationery, a large piece of paper either folded or unfolded; nautical, a sail, also the rope attached to the clew of a sail. As applied to paper, sheets follow two nomenclatures. Blank sheets of the stationers' trade are known by arbitrary names given to certain sizes, such as cap, legal cap, royal, demi-royal. But printed sheets are denoted, as to size, by an ancient system of Latin nomenclature, based on the number of folds required to bring to that size a sheet of certain dimensions. Thus a quarto is a sheet made of four folds, an octavo of eight, a duodecimo of 12, etc. (See Book.) From this idea of a folded, printed piece of paper a newspaper is often called a sheet, so, also, the leaves of books before bound, when the book is said to be "in sheets." A sail is called a sheet because it is made from a sheet of canvas and because it is broad, flat and thin. The rope called a sheet (abbreviated from sheet-rope) is used to hold a sail tight, or to haul it around and change its position.

SHEFFIELD, James Rockwell, American diplomat: b. Dubuque, Ia., Aug. 13, 1864; d. Saranac Lake, N. Y., Sept. 2, 1938. He graduated from Yale University in 1887, and from the Harvard Law School in 1889. Engaging in practise in New York City, he became, within a few years, one of its foremost advocates. He was interested also in politics, and served in 1893 as a member of the state assembly. In 1896 he became president of the board of fire commissioners of New York City. He was appointed ambassador to Mexico in 1924, and served during the period of friction between the United States and Mexico over the question of oil lands. He resigned in 1927. He was a trustee of the Carnegie Endowment for Industrial Peace.

SHEFFIELD, shĕf'ēld, **Joseph Earl,** American merchant and philanthropist: b. Southport, Conn., June 19, 1793; d. New Haven, Conn., Feb. 16, 1882. In 1813 he became a partner in a New York mercantile house, but subsequently removed to Mobile, Ala., where he acquired large interests in the cotton trade. From 1835 he was resident at New Haven, where he helped to obtain the charter for the New York and New Haven Railway, visiting London to secure the co-operation of capitalists. He also built the Chicago and Rock Island line. By his gifts and bequests of more than $950,000 the scientific department of Yale, since known as the Sheffield Scientific School, was reorganized and enlarged.

SHEFFIELD, city, Alabama, in Colbert County, on the Tennessee River; on the Louisville and Nashville; the Southern; and the Northern Alabama railroads; by rail, 84 miles south of Nashville, Tenn.; airport, with airline service. Sheffield, Florence, and Tuscumbia, the county seat, form the core of the Muscle Shoals region. Within a few miles on either side are the Guntersville, Wheeler, Wilson, and Pickwick Landing dams, sources of hydroelectric energy. The surrounding region has deposits of iron ore, limestone, phosphate, bauxite, rock asphalt, and clays. Sheffield has TVA fertilizer works and many large industrial plants.

Founded in 1883, the city was incorporated in 1885, and has the commission form of government. Pop. (1950) 10,767.

SHEFFIELD, city, England, in the county of York, West Riding, at the junction of the Sheaf and the Don rivers, on several slopes surrounded by wooded hills. The suburbs are attractively built, with many terraces and elegant residences. There are a great number of churches, chief of which is the parish church erected under the reign of Henry I, which contains some interesting monuments; St. Paul's, a good specimen of the Grecian; St. James'; St. George's; St. Philip's and St. Mary's, having exterior ornamentations of gargoyles, etc., and a graceful interior with a lofty and richly groined roof. The other buildings include the town hall, council hall and municipal offices, Corn Exchange, Norfolk Market, Theatre Royal, Athenaeum, libraries, association

halls, Mechanics' Institute, Albert Hall, Music Hall, Saint George's Museum, the Mappin Art Gallery and various others. The barracks are surrounded by extensive grounds. There are numerous hospitals and several monuments. Of educational and literary institutions the principal are Firth College; Wesley Ranmoor Methodist and People's College; grammar-school, public schools, art school, technical school; literary and philosophical institutions and museums. The University of Sheffield was founded in 1905 and is attended by over 2,125 students. The town enjoys all modern improvements. There are extensive botanical gardens. The Sheffield cutlery is celebrated, and all its manufactures of steel are famous, including heavy steel branches, such as armor plates, rail, large castings for engines, steel for rifles, etc. The other industries include the manufacture of optical instruments, iron and brass foundries, various mills, etc., besides silver plating, bicycles, cabinet-work, tanning, etc. Sheffield was in early times a Roman station and was an incorporated town under the Anglo-Saxons. In the 14th century it was already noted for its cutlery. Its history is also connected with the persecutions in the Netherlands, having been the refuge of victims suffering persecution under the Duke of Alva, who introduced their mechanical skill into the country. It developed rapidly in the 19th century, and became one of the greatest manufacturing cities of England. It was the first city of England to operate its street railway system. The electric-lighting and power plant, markets, artisans' dwellings, baths, free libraries, are also owned by the municipality. It sends five members to Parliament. Pop. 518,200. Consult Gatty, 'Sheffield, Past and Present' (London 1873).

SHEFFIELD PLATE. Of late years there has been a great interest in old Sheffield plate, which is now practically a lost art. Collectors pay large sums for specimens, which, a couple of decades ago, could be purchased for the proverbial «song.» Some connoisseurs prefer the peculiar lustrous quality that the mixture of copper and silver gives to silver itself; others are charmed by the models produced in this special ware. Notwithstanding the fact that many old families possess a few specimens of Sheffield plate, comparatively few persons know much about it, for the question has been little studied. At the present moment the collecting of Sheffield Plate has become something of a fad and «antique» shops tempt the buyer with real and spurious articles.

Old Sheffield Plate is a term used to describe articles of flat or hollow ware for table or domestic use made of copper coated with silver by fusion. In Sheffield Plated Ware the silver was laid on both sides of a sheet of copper, something like a sandwich with the copper in the middle, and the two metals, united by fusion, were then hardened by pressure between rollers. Hence its old name of «Copper Rolled Plate,» which describes it exactly. Sheffield Plate appears as a new invention in England in the year 1742; but it is more than likely it was a rediscovered process, for the art of imitating silver had reached a state of excellence in the 15th century. The art of imitating gold and silver was known to ancient nations. Assyrians, Egyptians and Hebrews were most skilful in the use of metals and in fine wire-work. The Romans left definite instructions regarding the application of gold and silver to articles of tin or copper and copper vessels coated with silver have been found at Herculaneum. The ancient Mexicans and Peruvians also made imitations of gold and silver and articles have been found in Peru that are silver plated on copper by a process very like that of Sheffield plating — the two metals having been amalgamated by heat. Sheffield Plate, or, to speak more correctly, Sheffield Plated Ware, dates from about 1743 and lasted for 100 years until it was superseded by electroplating about 1840. Sheffield in the reign of Queen Elizabeth was famed for its cutlery and also the fine parks, gardens and country-seats in its vicinity. Sheffield is now a place full of dirt and smoke, caused by the factories and iron and steel works. In 1742 Thomas Bolsover, a mechanic, was repairing the handle of a knife, which was composed partly of silver and partly of copper, when he accidentally fused the two metals. This showed him that it was possible to coat copper with silver in such a way as to form a cheap and durable metal presenting an exterior of silver only. He immediately began to manufacture articles of this kind (copper plated with silver), but he confined his efforts to small objects, such as buttons, snuff-boxes and other light and small articles. Then Joseph Hancock took up the business and began to imitate the finest and most richly embossed plate. Thus every kind of domestic article that had decorated the sideboard and buffet, which until then had been made of wrought silver only, was imitated in copper Rolled Plate.

Naturally, the new process was hailed with delight by the middle class, for it was possible now for people of ordinary means to have shining Sheffield Plated Ware who had heretofore contented themselves with pewter. The trade developed to such an extent that it was difficult to fill the orders that came from all parts of England and her colonies. The new process was also carried to Birmingham, London, Nottingham, Scotland and Ireland. Dublin became quite a centre for the new manufacture. Sheffield plate was also made in America.

The Sheffield manufacturers produced tea-urns, coffee and tea-pots, tea-kettles and lamps, epergnes, tankards and measures of all sizes, jugs, cups, goblets, tumblers, candlesticks, candelabra with branches, cruet frames, water and platter plates and dishes, dish-rims, crosses, tea-trays and waiters, bottle-stands, writing-stands, tureens, ladles, spoons, scallop-shells, canisters, mustard-pots, argyles, snuffer-trays, wine-funnels (round and oval), salt-cellars, bottle-labels, decanter-labels, cream-labels, bread and sugar baskets, skewers, lemon-strainers, cheese-toasters, chocolate pots, saucepans, stewpans, snuff-boxes, bridle bits, stirrups, buckets, spurs, knife and fork handles, buttons for saddles and many other small articles.

Horace Walpole, writing in 1760, says: «As I went to Lord Stafford's I passed through Sheffield. One man there has discovered the art of plating copper with silver. I bought a pair of candlesticks for two guineas; they are quite pretty.» Classification is difficult because the dealers have, unfortunately, divided up Sheffield in a way rather misleading to the

historian and art-critic. Dealers have named the first examples of Sheffield «Queen Anne,» which is absurd, because Sheffield plated ware began in the reign of George II. However, as dealers' names appear in catalogues of auction sales, etc., it is well to understand that what they mean by Queen Anne is applied to designs of the Queen Anne type, rather short and squat models in which the gadroon is the chief ornament. Dealers divide Sheffield plated ware into five periods: (1) Queen Anne; (2) early Georgian; (3) late Georgian; (4) Empire; and (5) Late. Sheffield Plated Ware followed all the styles that the silversmith introduced. Consequently the early and late Georgian show Louis XV and Chippendale styles and Louis XVI designs. The third period, from 1770 to 1785, is the most attractive of all because of the delicate and slender oval and the charming style of Adam, Heppelwhite and Sheraton ornamentation. Next comes the Empire style; and, finally, the last period, which is ornate and florid; but not by any means to be despised, because very splendid things were produced. The wire-work dates from 1790 to 1810. The perforated pieces come later. As a rule, the borders are of solid silver. In the earliest pieces the edge consists of a solid silver thread, or several threads; then comes the gadroon (or fluted) edge; then the gadroon and shell; and then the florid. Sheffield Plated Ware was often beautifully engraved.

Collectors should notice the difference between «Old Sheffield Plated Ware» which is silver-plated copper, and modern Sheffield Plated Ware, which is copper electro-plated. Counterfeit articles are made of copper and electro-plated.

Two or three points form a good test of the genuineness of old Sheffield Plate. One is the presence of embossed relief work of solid silver on all ornamented articles. Another test is the bands or narrow strips of silver to be found wrapped round the edges and under the mounts, which are put there to conceal the joints and bare edges of the copper. Another reliable test is the inlaid shield.

Nothing was hall-marked until 1784. Manufacturers also had special devices, viz., W. and G. Sissons, a bell; Watson, an open hand; Fenton Creswick and Company, crossed arrows; Boulton Bingham, ball and horseshoe; Walker Knowles and Company, ball and cross; Daniel Hoyle and Company, pineapple; Wilkinson and Company, cross keys, and so on. The chief authority is Bradbury's 'History of Old Sheffield Plate' (1912). Consult also Veitch, H. N., 'Sheffield Plate' (1908); Burgess, F. W., 'Silver: Pewter: Sheffield Plate' (1921); Okie, H. P., 'Old Silver and Old Sheffield Plate' (1928).

ESTHER SINGLETON.

SHEFFIELD SCIENTIFIC SCHOOL, a department of Yale University. See YALE UNIVERSITY.

SHEIK, shēk, an Arabic word signifying an aged man or elder, is used generally as a title of reverence and has come to acquire a great variety of significations. Among the Bedouins and other migratory tribes where patriarchal government prevails, the head of every tribe is called a sheik. The superiors of the Mohammedan religious or monastic orders are called sheiks. The chief mufti is called sheik-ul-islam. In general the title is given to learned men, and by a wider extension is used as a common title of courtesy, like Mr.

SHEIL, shēl, **Richard Lalor,** Irish orator, dramatist and politician: b. Drumdowney, 17 Aug. 1791; d. Florence, Italy, 25 May 1851. He was educated at Stonyhurst College and Trinity College, Dublin, studied law at Lincoln's Inn and was called to the bar in 1814. His progress in his practice was slow and he turned to dramatic writing, having already produced a moderately successful drama, 'Adelaide' (1814). A tragedy, 'The Apostate,' was produced in 1817, and ran through the season. He produced 'Bellamira, or the Fall of Tunis' (1818); 'Evadne' (1819); 'The Huguenot' (1822), and with John Banim, 'Damon and Pythias.' Of these 'Evadne' is considered the best. He next joined with Curran in contributing to the *New Monthly Magazine* the 'Sketches of the Irish Bar.' In 1825 he visited London with O'Connell, O'Gorman and others to protest against the bill that had been introduced for the suppression of the Catholic Association, and during the progress of the agitation continuing until 1829 spoke many times in public meetings in Ireland in behalf of the Irish cause. When emancipation was finally secured, Sheil moved the dissolution of the Catholic Association. In 1830 he entered Parliament from Milbourne Port in Dorset, sat for County Louth in 1831 and in 1833 was member of the first reformed Parliament for County Tipperary. He gradually withdrew from a close identification with the Irish cause and turned his attention more to the foreign policies of the empire. Shortly after the accession of William IV he became commissioner of Greenwich Hospital, but later exchanged this post for the vice-presidency of the Board of Trade. In 1846 he was appointed master of the mint and his inability to move in the relief of the famine in Ireland, though not thoroughly understood in that country, yet diminished his popularity. His last appointment was that of Minister to the court of Tuscany in 1850. He was brilliant in Parliamentary speaking, though he lacked spontaneousness, and carefully prepared each address. Of his forensic speeches that delivered as counsel for John O'Connell at the «monster trials» in Dublin in 1844 is accounted his best. His 'Speeches' was edited by McNevin (Dublin 1845). Consult McCullagh, W. T., 'Memoirs of Richard Lalor Sheil' (London 1855).

SHEKEL, a unit of weight supposed to have been first used in Babylonia and afterward by the Jews and other peoples; also a coin used by the Jews and thought to have been introduced by Simon Maccabæus. The weight was reckoned as one-sixtieth part of a maneh, and afterward was revised by the Phœnicians to be one-fiftieth part of a maneh (then called mina). It is probable that the shekel, with other measures of weight, underwent much revision as to size, shape and weight. Phœnician shekels are found in the following weights: 234 grains (Troy), 224 grains, 218 grains, 208 grains. The Assyrian shekel was of 129 grains; their double shekel of 258 grains. The Jewish shekel was of 218 grains.

The use of the shekel as money among the ancient Hebrews is popularly supposed to date with Simon Maccabæus, to whom was given

(1 Mac. xv, 5) the power "to coin money for thy country with thine own stamp." Whether or not Simon made use of this privilege is disputed by some authorities, but it is generally conceded that either he or his son coined the first native Hebrew money. This was about 141 B.C. The shekel seems to have been of gold, copper or silver, and originally of a shekel in weight. The gold shekel was worth about $5.69, the copper about three cents and the silver shekel about 54 cents. The silver shekel seems to have been the most used. A common example of it shows on one side a pot of manna, or sacred bread, with the legend "shekel of Israel"; on the reverse a flower figure, supposed to have been a representation of Aaron's rod budding, and the legend "Jerusalem the holy." The shekel of the sanctuary (Ex. xxx, 13) or temple tax was supposed, for a long period, to have been a special coinage, but it is now believed to have been the silver shekel of the country. Consult article "Money" in Hastings' 'Bible Dictionary' (New York 1900); Madden, F. W., 'Coins of the Jews' (London 1881); Reinach, T., 'Jewish Coins' (1903).

SHEKINAH, shē-kī'na, a post-Biblical abstract term, signifying "he who dwells," from the Biblical *Shakan,* to dwell, employed as a substitute for God to avoid certain anthropomorphic words in the Bible. It is used particularly in such passages where God is mentioned as dwelling either in the tabernacle or among the people, to express the majesty of the divine presence. It was used primarily to soften terms applied to God and to prevent by a kind of periphrasis false views as to His manifestations in the popular mind. At the root of its employment was the innate antagonism of the Israelite to any materialistic conception of the divine. It is found most frequently in the Targumim or Aramaic paraphrases of the Old Testament, written when Hebrew had ceased to be the popular language.

A few illustrations will make the usage clear. The Targum of Onkelos renders the sentence (Ex. xxix, 45) "And I will dwell among the children of Israel and be their God," as "And I will cause my Shekinah to dwell." In Isaiah (xxxiii, 17), "thine eyes shall see the King in all His beauty" became "Thine eyes shall see the Shekinah of the King of the worlds in His beauty." Onkelos translates "Elohim" in Gen. ix, 27 by "Shekinah" or whenever the person, dwelling, radiant majesty of the divine is mentioned. Even the temple of Solomon is called "the house of the Shekinah," which also took the place and meaning of the Aramaic *Memra* "name," *logos* and *Yekara,* "glory" in Talmud and Midrash. It is employed, too, in the New Testament — the Greek word for "glory" *doxa* being regarded as equivalent to Shekinah. G. H. Box gives as the most notable passage Romans, ix, 7, where Paul, mentioning the privileges of Israel, states "whose is the adoption and the glory," the visible presence or Shekinah of God among His people.

As to the nature of the word, it sprang into usage in a polemical era. Rabbinical opinions have not been unanimous. Schechter seems to regard as unfortunate the attempts of the rabbis to allegorize in the days of other than more aggressive philosophies. «What to the rabbis was a simple adjective, a reverential expression, or a poetical metaphor turned into the hands of the Hellenists into a new deity an aeon, or a distinct Emanation,» as he writes in 'Some Aspects of Rabbinic Theology' (p. 43). In later centuries Maimonides in his 'Guide to the Perplexed,' which sought to interpret the law of Moses by the logic of Aristotle or to coordinate both philosophies, considered the Shekinah as a distinct entity, a light proved to be intermediary between God and the world. On the other hand, Nachmanides deemed it the essence of God manifested in a distinct form. An attempt has been made by Weber to differentiate the Talmudic from the Targumic conception of the Shekinah but without success. The difficulty of an exact definition is due not only to the fact that diverse ideas have been associated with it, but to the circumstance that in rabbinical literature, extending over many centuries, the utmost freedom of opinion is exercised and full citations must be given to understand aright their views. In their homiletical interpretations in particular the rabbis were rich and naïve in fancy.

Bibliography.— Bähr, 'Symbolik des Mosaischen Cultus'; Etheridge, 'The Targums on the Pentateuch'; Schechter, 'Some Aspects of Rabbinic Judaism'; Schürer, 'History of the Jewish People'; Taylor, 'Sayings of the Jewish Fathers' (3d ed., p. 43); Weber, 'Jüdische Theologie.'

ABRAM S. ISAACS.

SHELBURNE, shĕl'bėrn, **William Petty Fitzmaurice,** LORD, 1st Marquis of Lansdowne: b. Dublin, 20 May 1737; d. London, 7 May 1805. He entered Oxford, but two years later left the university and entered the army. While engaged in the campaign in Germany he was returned to the House of Commons for High Wycombe in 1760, and was re-elected in the following year. He was also elected to the Irish Parliament, but he never sat in either body, for the death of his father in 1761 elevated him to the House of Lords. He was frequently employed by Butte as a negotiator in political combinations and on 30 April 1763 he became president of the Board of Trade and Foreign Plantations with a seat in the Cabinet; but his speech in the debate on the proceedings against Wilkes caused his dismissal from his staff appointment. In April 1764 he took his seat in the Irish House of Lords as Earl of Shelburne, and in 1766 took a leading part in the English Parliament in the repeal of the Stamp Act. Under Pitt he became Secretary of State for the Southern Department (23 July 1766), and in the following month the entire control of the administration of the colonies was placed in his hands. He endeavored to pursue a conciliatory policy toward the American colonies, but in this was thwarted by his colleagues, and in January 1768 was superseded by Lord Hillsborough. He stood alone with Chatham against coercing the American colonies, but his opposition was unavailing. In his Parliamentary speeches, many of which became famous, he always opposed the coercive measures of Lord North's ministry, recommended measures for ending the hostilities in America, but declared he would never consent to the acknowledgment of American independence. When Lord North resigned in March 1782 Shelburne declined the

king's invitation to form a new ministry, but acted as intermediary in pressing the post upon Rockingham. In the Cabinet formed by the latter he became Secretary of State for Home Affairs, and tried to introduce several economic reforms. Rockingham's death occurred in July of that year and Shelburne accepted the duty of forming a government. In this ministry William Pitt, then only 23, became Chancellor of the Exchequer. In the debate on the change of ministry Shelburne declared that he still adhered to all the constitutional ideas that he had imbibed from his master in politics, Lord Chatham, and that he had not altered his opinion concerning American independence; but during the negotiations of the Peace of Paris he was reluctantly led to agree to the concession. The coalition of North and Fox against his government led to his resignation 24 Feb. 1783. In December 1784 he became Marquis of Lansdowne in the English peerage. He was one of the most hated men of his time, a circumstance probably due to his independent spirit in party politics and his supercilious manners. Yet many of his views were more enlightened than his times. He advocated Parliamentary and economic reform, Catholic emancipation and religious equality and free trade. Disraeli said he was «the first great minister who comprehended the rising importance of the middle class.» He patronized literature and the fine arts and his later years were largely devoted to his collection of books and pictures. Consult Fitzgerald, 'Fitzmaurice, Life of William, Earl of Shelburne' (1875–76; revised ed., London 1912).

SHELBURNE, Canada, capital of Shelburne County, Nova Scotia, a seaport town on the southwest coast at the head of a deep and capacious bay, forming one of the safest harbors of the province, 140 miles southwest of Halifax. Shelburne is a station on the Canadian National Railway and has an important maritime and transit trade. Ship repairing docks and ironworks are the chief industrial establishments, and its fisheries are valuable. The Roseway River supplies abundant waterpower. The entrance to the harbor is marked by a lighthouse on McNutt's Island; it exhibits two lights, the highest 120 feet above the sea. After the American Revolution the population of Shelburne was increased to about 12,000 by the advent of United Empire Loyalists. Pop. (1951) 2,040.

SHELBY, Isaac, American soldier; b. North Mountain, Md., 11 Dec. 1750; d. Traveller's Rest, Lincoln County, Ky., 18 July 1826. He became a surveyor and in 1771 removed to Tennessee. In 1774 he was appointed lieutenant in the company of his father, Gen. Evan Shelby, fought at the battle of Point Pleasant and remained in command of the fort there until 1775. He was engaged at the battle of Long Island flats where his valor won the day, became commissary of the frontier in 1777 with rank as captain, in the succeeding year was promoted colonel, and also served as a member of the Virginia house of delegates in that year. He planned the important action at King's Mountain in 1780, served under Marion in 1781 and under Greene in 1781–82, and was a member of the North Carolina legislature in those years. He was a member of the Constitutional Convention in 1791 and was elected the first governor of Kentucky in 1792, served until 1796 and again in 1812–16. He recruited and led 4,000 men to the relief of General Harrison in Canada in the War of 1812, receiving a gold medal from Congress for his services. He declined the office of Secretary of War in 1817 and afterward lived in retirement, though he acted as commissioner with General Jackson in negotiating the treaty with the Chickasaw Indians in 1818. Nine counties in the Southern and Western states are named in his honor, as is also a college at Shelbyville, Ky.

SHELBY, city, North Carolina, and Cleveland County seat, altitude 1,000 feet; on the Southern, and Seaboard Air Line railroads, and state and federal highways. It is the center of a rich agricultural area, producing cotton, dairy products, fruit, and beef cattle. Its principal industries are textiles, hosiery manufacture, food processing, making of furniture, and fertilizer. The water and lights are municipally owned and operated. Government is by a mayor and four city councilmen. Pop. (1950) 15,508.

SHELBYVILLE, Ill., city and Shelby County seat, alt. 601 feet, on the Kaskaskia River; on the Chicago and Eastern Illinois and the New York Central railroads; by rail, 194m. SW. of Chicago. The city is a trading center for an agricultural region with a number of small towns, and its industries are principally connected with the processing of farm products. City government is by mayor and commissioners. Pop. (1950) 4,462.

SHELBYVILLE, Ind., city and Shelby County seat, alt. 768 feet, on the Big Blue River; on the Cleveland, Cincinnati, Chicago and St. Louis Railroad and (for freight service) the Pennsylvania Railroad; by rail, 27m. SE. of Indianapolis; airport, with airline service. The principal industrial products are fireless cookers, furniture, lawn mowers, gas ranges, overalls, and canned foods.

Shelbyville's civic organizations include a Carnegie library, a county museum, located in the courthouse, a music appreciation society, the William S. Major Hospital, and the Inlow Clinic. Laid out in 1822, Shelbyville was incorporated as a town in 1850 and was given its charter as a city in 1860. It has mayor and council. Pop. (1950) 11,734.

SHELBYVILLE, Ky., city and Shelby County seat, alt. 760 feet; on the Southern, the Louisville and Nashville, and the Chesapeake and Ohio railroads; by rail, 32m. E. of Louisville, 24m. W. of Frankfort. Surrounding the city is a region of agriculture and stock raising, with tobacco as a main crop. Corn, cereal grains, and alfalfa hay are also produced. In accord with the character of its environment, the city has flour and feed mills and tobacco warehouses. Shelbyville is rated as the second largest tobacco market in the state. Civic centers include a public library, several churches, and a hospital, the post office, and the courthouse. Founded in 1792, the town, like the county, was named in honor of Isaac Shelby (q.v.), first governor of Kentucky. Near by, Daniel Boone's brother built a fort, which in 1781 was abandoned by the settlers

who were attacked by the Indians while on their way to the fort at the Falls of the Ohio. Government is administered by mayor and council. Pop. (1950) 4,403.

SHELBYVILLE, town, Tennessee, and Bedford County seat, altitude 771 feet; on the Nashville, Chattanooga and St. Louis Railroad; by rail, 63 miles southeast of Nashville. Located on the Duck River, the town is a trading center for the valley, an agricultural region with some mineral deposits. Rubber goods, graphite, and pencils are its principal products. There are also knitting mills. In the 1920's industrial advancement brought rapid growth to this Tennessee town. Platted in 1810 and incorporated in 1819, Shelbyville was named for Col. Isaac Shelby, who fought at King's Mountain and became first governor of Kentucky. During the Civil War, Shelbyville was the scene of many skirmishes. The town's government is administered by mayor and council. Pop. (1950) 9,456.

SHELDON, shĕl'dŭn, **Charles Monroe,** American Congregational clergyman and author: b. Wellsville, N. Y., Feb. 26, 1857; d. Topeka, Kans., Feb. 24, 1946. He was graduated from Brown University in 1883, from the Andover Theological Seminary in 1886, and was ordained in 1886. In 1889 he became pastor of the Central Congregational Church of Topeka, Kans. In 1900 he attracted considerable attention by his connection with the Topeka *Capital* of which he took entire charge for one week, and which he published as a distinctively Christian daily after principles enunciated in his book, *In His Steps* (1896).

From 1920 to 1925 he was editor of the *Christian Herald,* and thereafter was contributing editor. Other volumes by him include *Richard Bruce* (1891); *Robert Hardy's Seven Days* (1892); *The Twentieth Door* (1893); *The Crucifixion of Philip Strong* (1893); *John King's Question Class* (1894); *His Brother's Keeper* (1895); *Malcolm Kirk* (1897); *Lend a Hand* (1897); *The Redemption of Freetown* (1898); *The Miracle at Markham* (1898); *One of the Two* (1898); *For Christ and the Church* (1899); *Edward Blake* (1899); *Born to Serve* (1900); *Who Killed Joe's Baby?* (1901); *The Wheels of the Machine* (1901); *The Reformer* (1902); *The Narrow Gate* (1902); *The Heart of the World* (1905); *Paul Douglas; The Good Fight* (1909); *Howard Chase* (1917); *A Little Book for Every Day* (1917); *All the World* (1918); *Heart Stories* (1920); *In His Steps Today* (1921); *The Richest Man in Kansas* (1921); dramatic version of *In His Steps* (1923); *The Everyday Bible* (1924); *Two Old Friends* (1925); *Charles M. Sheldon—His Life and Story* (1925); *Let's Talk It Over* (1929).

SHELDON, Edward Brewster, American dramatist: b. Chicago, Ill., Jan. 14, 1886; d. New York, N. Y., April 1, 1946. He was graduated at Harvard in 1907 and took his A.M. there in 1908. His first play *Salvation Nell* (1908), in which Mrs. Minnie Maddern Fiske starred, was written while pursuing postgraduate studies. His plays include: *The Nigger* (1909); *The Boss* (1912); *The High Road* (1912); *Romance* (1913); *The Song of Songs* (1914); *Garden of Paradise* (1915); *Bewitched* (1924); *Lulu Belle* (1926); and *Dishonored Lady* (1930).

SHELDON, Edward Stevens, American philologist: b. Waterville, Me., Nov. 21, 1851; d. Cambridge, Mass., Oct. 16, 1925. He was graduated at Harvard University, 1872, and later studied at Berlin, Paris and Leipzig. From 1877 he was connected with the modern languages and Romance philology departments at Harvard, and after 1894 was professor there.

SHELDON, Henry Clay, American Methodist Episcopal theologian and educator: b. Martinsburg, N. Y., Mar. 12, 1845; d. Aug. 4, 1928; graduated at Yale University in 1867 and at the Boston University School of Theology in 1871, was ordained and served as a pastor in 1871–1874. He was professor of historic theology at the Boston University School of Theology in 1875–1895, and thereafter was professor of systematic theology there. He was the author of *History of Christian Doctrine,* 2 vols. (1886; 4th ed., 1906); *Studies in Recent Adventism* (1915); *Theosophy and New Thought* (1916); *The Mystery Religions and the New Testament* (1918); *Pantheistic Dilemmas and Other Essays in Philosophy and Religion* (1920); *The Essentials of Christianity* (1922).

SHELDON, John Lewis, American botanist and bacteriologist: b. Voluntown, Conn., Nov. 10, 1865. He was graduated from Ohio Northern University, B.S., 1895, M.S., 1899, and from the University of Nebraska, B.S., 1899, A.M., 1901, and Ph.D., 1903. From 1885–1890 and again from 1895–1897 he taught in the public schools of Connecticut. In 1899–1900 he was acting head of the department of biology at the Nebraska State Normal School. He then returned to the University of Nebraska as instructor in botany, 1901–1903, and then went to West Virginia University as professor of bacteriology and bacteriologist at the Agricultural Experiment Station, 1903–1907, as professor of botany and bacteriology, 1907–1913, and as professor of botany, 1913–1919.

SHELDON, Samuel, American electrical engineer: b. Middlebury, Vt., 1862; d. Sept. 4, 1920. He was graduated at Middlebury College in 1885, and from the University of Wurzburg in 1888. He was assistant in physics at Harvard in 1888–1889, and from 1889 was professor of physics and electrical engineering at the Brooklyn Institute of Arts and Sciences. In 1903 he was appointed an expert in the Swiss department of justice and police. He was the author of *Dynamo Electric Machinery* (1900; 9th ed., 1915); and joint author of *Alternating Current Machines* (1902; 9th ed., 1911), and *Electric Traction and Transmission Engineering* (1911).

SHELDRAKE or **SHELD DRAKE,** a sea-duck (*Tadorna cornuta*) of the cooler parts of the Old World, which frequents sandy shores and makes its nest in burrows in sand-dunes, earthen cliffs, old rabbit-warrens, etc. It is of large size and very handsome plumage; head and upper neck dark, glossy green, broad white collar below, with a broader band of bright bay extending from the back across the breast. It is somewhat larger than an ordinary duck and the female is smaller and less brilliantly colored. In the Frisian Islands and some other parts of the world the people provide it with acceptable artificial breeding-burrows and take a portion of its eggs and down, so making an annual profit

from the arrangement. Several other species of the same genus are found throughout Africa, southeastern Asia and Malaya, one of which is well known in India as the Brahmany duck. Much interest attaches to these birds and the name itself is a matter of curious speculation.

SHELIA, Jebel. See CHELIA, DJEBEL.

SHELIFF. See CHELIFF.

SHELL, shĕl, the hard, protective covering of various forms of plants, especially nuts and seeds, and animals, such as turtles, the eggs of birds and reptiles, or the rigid "external skeleton" of some invertebrates, such as foraminifers, echinoderms, crustaceans, brachiopods, but especially of mollusks which include clams, snails, and other sea shells. This article is restricted to the shells of the Mollusca (q.v.), while the characteristic structures of other shells, tests, and exoskeletons are described under separate headings. (See CRUSTACEA; ECHINODERMATA; EGG.)

Shells are produced as hard, limy exoskeletons by the vast majority of the mollusks, although some shells may be internal as in the cuttlefish, squids, a few clams, and many opisthobranch sea slugs, or are entirely absent as in most land slugs and all nudibranch sea slugs. Sea shells are produced by five marine classes of mollusks: the gastropods (snails or univalves), the pelecypods (clams, mussels, oysters, or bivalves) and three minor groups, the scaphopods (tusk and tooth shells), the cephalopods (chambered nautilus), and amphineurans (chitons or coat of mail shells). It is estimated that about half of the 100,000 living species and forms of mollusks are from the seas, while the others are from freshwater habitats (such as river mussels and pond and aquarium snails) or from terrestrial habitats (garden snails and tree snails).

Structure and Growth of Shells.—The shell material is produced in the form of a liquid secretion mainly from glands located along the edge of the fleshy, capelike mantle, an organ common to all mollusks. The liquid calcium carbonate becomes crystallized to form additions to the hard shell when mixed with a colloidal albumen which is also produced by the mantle. Shell deposition is not continuous, but occurs periodically during the life of the animal, sometimes every few days, weeks, or even seasonally. Growth is generally inhibited during unfavorable environmental conditions, such as abnormally cold or dry weather, paucity of food, or during and just after breeding periods. A minor amount of shell material is produced by other regions of the mantle for the purpose of repairing cracks and holes or encasing foreign particles (see PEARL). The foot in gastropods secretes a hard, calcareous operculum or trapdoor.

Shell growth begins early in the development of the larval form of the mollusk, and in most snails the young already have two or three spiral shell whorls, known as nepionic or nuclear whorls, before they hatch from the egg capsule. In the young stages of many bivalves, the early free-swimming form, such as the spat, or young, of oysters, has two shelly valves which in a few days grow too large and heavy to permit further swimming. Additional growth occurs in clam shells along the free edge of the valve, and, in the case of snail shells, along the rim of the outer lip of the aperture. In the spiral forms of univalves, the shell may be thought of as a regularly increasing or expanding cone which is wound around an axis or the columella of the shell. The many different shapes of univalve shells are determined by genetic factors which, in turn, control the rate of expansion of the aperture, the degree and regularity of the plane in which the new whorls are added and, to a lesser degree, by the major modifications in sculpturing. Water currents, waves, food, temperature, and other outside conditions may influence growth during the lifetime of an individual.

The span of life and maximum age of marine species are very imperfectly known. Undoubtedly many species live for only two, three, or four years. The common European periwinkle (*Littorina littorea*) found in New England has been kept alive in captivity for twenty years. Large specimens of the horse conch, the queen conch (*Strombus gigas*) and the cameo king conch (*Cassis*) probably represent 10 to 25 years of growth. The nudibranch sea slugs are believed to be short-lived, and *Aeolis* and *Goniodoris* have been shown to survive only into the second year. It is believed that the giant clam (*Tridacna*) of the Indo-Pacific region lives for perhaps 100 years, but this has not been confirmed by experiments or accurate calculations. The average age of the Atlantic bay scallop is about 16 months, its maximum age only two or three years. The average age of a five-inch pismo clam on the Pacific coast is about eight years, its maximum age 25 years.

There are two fundamental types of sculpturing in spirally coiled gastropods: *spiral* and *axial*. The former is expressed as ridges, cords, threads, channels, and cut lines which all follow the direction of growth of the shell, while in axial sculpturing the formation of ribs, ridges, and varices is parallel to the edge of the growing lip. In the bivalves, sculptural features that parallel the growing edge of the valve are spoken of as *concentric*. Some mollusks may produce remarkably smooth shells that resemble highly glossed porcelain, while others make ornately sculptured or grossly spined shells.

Marine Shells.—The marine bivalves show remarkable diversity in shape and mode of life. Most, however, are sand dwellers and live just below the surface of the muddy sand where they keep in contact with food-laden ocean water by means of two fleshy, tubular siphons. In the Venus clams, the surf clams (*Mactridae*), and Lucine clams the siphons are very short, while in others, such as the common soft shelled clam (*Mya*) and the angel wing of Florida (*Barnea costata*) which live far below the surface, the siphons are encased in a very long muscular tube.

The oysters are without siphons or functional foot and remain attached to the hard substrate during adult life. The coon oyster lives among the branches of the mangrove trees of the tropics and is able to feed and breathe only during high tide. The distantly related thorny oysters (*Spondylus*) which live in fairly deep tropical waters are renowned for their vivid colors and long, delicate spines. Those from the Gulf of Mexico command high prices among shell collectors.

A number of bivalves have become specialized to the extent of making burrows in wood, compact clay, and soft stone. The elongate, brown date mussels (*Lithophaga*) secrete acid with which they etch out their homes in coral blocks. Their own shells are protected from the acid by

a tightly fitting jacket of horny periostracum. The shipworms (*Teredo* and *Bankia*) since time immemorial have plagued seafarers by destroying wooden plankings of ships, wharf pilings, and manila hemp lines. The animal of this clam resembles a long, white worm with the two cutting shells at one end and the siphons at the other. Strangest of the bivalves is the watering-pot shell (*Aspergillum*) of the East Indies and Indian Ocean, about six inches in length, which resembles the spout of a garden watering pot. The circular, swollen end of the calcareous tube is perforated with numerous small holes, and the only clamlike feature to the shell is two tiny valves on one side of the tube.

The ability to swim is rare among adult bivalves. Scallops (*Pecten*) include many species which can swim for several dozen feet at a time. The movement is accomplished by the rapid snapping of the two shelly valves. While the scallops always swim with their valves in a horizontal plane, the *Lima* file clams most frequently progress edgewise, that is, with the breadth of the valves vertical or slightly oblique. The long, colorful tentacles of the *Lima* keep the animal momentarily suspended in water while the valves are being opened in preparation for another "bite" forward. The *Lima* is a poor swimmer and, because of its habit of building nests under rocks, apparently has no incentive to undertake migrations as is done by schools of scallops.

Sea shells vary greatly in size; the adults of some tiny *Rissoa* snails never exceed $\frac{1}{32}$ of an inch, while the horse conch (*Pleuroploca gigantea*) of the lower Florida Keys may reach a length of two feet. Of equal size is the great spindle shell (*Megalotractus*) from the Great Barrier Reef off Australia. Among the marine clams, the amethyst, gem clam found in shallow, sand-bottomed bays of eastern United States, is one of the smallest bivalves, barely exceeding $\frac{1}{16}$ of an inch. The largest known living shelled mollusk is the giant clam (*Tridacna gigas*) of the tropical Indo-Pacific region. It may reach a length of four feet and a total weight of 500 pounds. Contrary to popular belief, it is not a man-eating clam, but lives upon single-celled seaweeds or algae which grow symbiotically within the tissues of its mantle. Apparently, there has been no authenticated record of its having trapped and drowned a human.

Perhaps the oddest of the marine snails are the carrier shells (*Xenophora*) which gather and attach to themselves other dead shells, bits of coral and stones. Viewed from above, the carrier shell resembles a pile of marine debris, and this peculiar habit is believed to be of camouflage or protective value to the animal. The animal holds the edge of its shell to the foreign object and secretes from the fleshy mantle liquid calcium carbonate which soon hardens to form the permanent attachment.

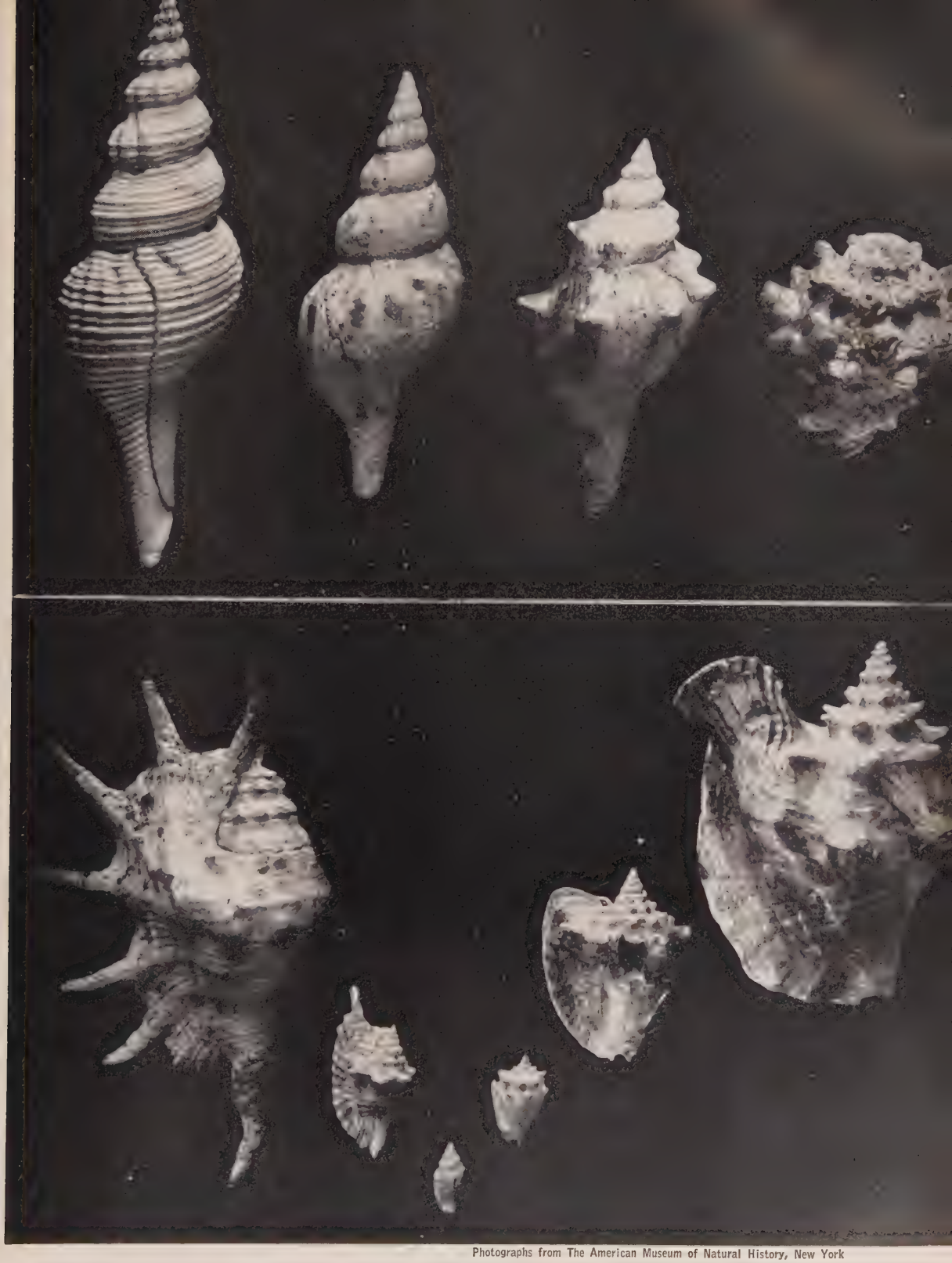
The four families of marine snails most sought after by collectors of sea shells are the cones (Conidae), cowries (Cypraeidae), volutes (Volutidae) and the olive shells (Olividae). The several hundred species of living cones are warm-water inhabitants, all of a standard inverted conic shape with little major variation in sculpture, but quite variable in their attractive color designs. Rarest of them is the famous glory of the seas cone from the East Indies and the Philippines. There are only two dozen known specimens, all exhibiting a graceful, smooth spire and intricate yellow and red color markings. Specimens of this cone in 1956 were valued at from $500 to $1,000, depending upon size and condition. Several species of cones from the Indo-Pacific region are known to inflict a sting that is fatal to man.

The shell of the cowrie, of which there are about 160 living species, is well-known for its highly glossed finish, smooth and rounded contours, and brightly hued color patterns. The small yellow money cowrie (*Cypraea moneta*) was for many centuries used as a form of money in Africa and southern Asia. It also played an important part in religious rites and was used as a symbol of fertility and life. The four-inch-long golden cowrie is a particularly choice collector's item because of its comparative rarity and unusual orange-cream color. It lives in the reefs of the Central Pacific from the Philippines to the Fiji Islands, but only in the latter area is it worn around the necks of native chiefs as a sign of high rank or royalty.

Collectors of fancy sea shells are constantly in search of specimens of outstanding qualities, and although a number of species are well-known for their high value or unusual beauty, the standards by which their rarity and attractiveness are judged are quite varied. For many conchologists rarity is gauged by the top price that a specimen may bring; for others the important judging point is the scarcity of the species in nature or perhaps the rarity of specimens in collections. Left-handed, double-mouthed, or distorted specimens, like misprints in stamps, are highly valued by many veteran collectors. There are literally hundreds of truly rare species, but most of these are deep-sea shells, some of which are known only from a single specimen. Most of these are small and not particularly attractive. The high-priced shells are found among the showy genera, like the cones, volutes, murex shells, scallops, and cowries. Some species may be considered rarities for years and command very high prices before they are collected in large quantities. The precious wentletrap (*Epitonium scalare*) of the West Pacific was in such demand years ago that Chinese traders found it profitable to make counterfeits out of rice paste. The species is now considered reasonably common and is low-priced, but genuine rice counterfeits are now rare and equal in value to the price of the first-known shell specimens.

Distribution.—Sea shells are found in every ocean, from the shoreline to the very deepest parts of the seas, and from the polar regions to the tropics. Each major area in the world has sea shells unique to its waters, although a few species, particularly those that live at the surface of the ocean, are worldwide in distribution. The geographic boundaries of past geologic oceans and environmental conditions, especially water temperature and salinity, have been responsible for the formation of these faunal and subfaunal regions.

Largest and richest of these regions is the Indo-Pacific, a vast, tropical marine area extending from the western shores of Africa, through the Indian Ocean to Japan, Australia, and the Polynesian Islands. The area is known for its richness in number of species, particularly among such groups as the cowries, cones, terebras, turbans, and venus clams. Some showy genera are unique to the Indo-Pacific, such as the spider conchs (*Lambis*), the chambered nautilus and the giant clams (*Tridacna*). Not all sections of the Indo-Pacific are excellent collecting grounds, either



Photographs from The American Museum of Natural History, New York

SHELLS

The widening of the lower whorl is demonstrated in these arrangements of spindles (*top*) and conchs (*bottom*).

SHELLS

Above: An arrangement showing the divergent development of the outer lip of the conch and spider shell.

Left: Three shells broken to show the winding of the coil around the axis.

Below: Three types of screw shells.

Photographs from The American Museum of Natural History, New York

because of excessive fresh water, muddy conditions, or because of lack of sufficient nitrogenous foods. The richest areas are along the east coast of Africa from Kenya to Mozambique, the section off the coast of Queensland, Australia, several small areas throughout the East Indies, the Philippines, and the Ryukyu Islands.

Second to the Indo-Pacific in attractive sea shells is the West Indian region which includes the Caribbean and the Antilles, from Bermuda to Florida and south to Brazil. Although not particularly rich in species, some genera possess large and attractive species, such as the triton trumpet (*Charonia*), the true conchs (*Strombus*), the helmet shells (*Cassis*), and the tulip shells (*Fasciolaria*). The wentletraps (*Epitoniidae*), Lucine Clams, and Marginellas are represented by numerous species.

The Mediterranean region is semitropical in nature and comparatively rich in species, about 2,000 in all being known. Generically it resembles the West Indian region. Other distinctive molluscan faunas are found in South Africa, the Patagonian region of South America, the tropical Pacific-Panamic area, the west coast of North America, and the New Zealand-Tasmanian region.

Freshwater Varieties.—Freshwater shells are represented by only two of the classes of mollusks, the snails and the clams. The estimated 10,000 species exhibit remarkable variation in shape and sculpture, ranging from the 14-inch-long river mussels of eastern China to the pinhead-sized Amnicolid snails of American lakes and ponds. They live in a variety of habitats, some occurring in hot springs, the bottom of very deep lakes, within caves, or at the foot of waterfalls, while others can survive in hot, temporary ponds and drainage ditches of the tropics or in the frozen ponds of the polar regions.

The principal families of freshwater snails are the Viviparidae, the large, operculated apple snails that are sometimes used in aquaria; the Thiaridae, worldwide and abundant, turret-shaped, operculated snails; the Hydrobiidae, small, coiled shells usually less than a half inch in size, some of which carry serious parasitic diseases in the Orient; the Planorbidae, a worldwide group of pulmonate pond snails to which belongs the familiar Red Ramshorn of home aquaria; the Lymnaeidae pond and lake snails, some of which in northern United States carry a parasitic disease known as swimmer's itch. The most conspicuous freshwater bivalves are the river mussels or unios of which there are several dozen genera found in the major watersheds of the world. Many of them are large and have an attractive, lustrous interior. In the Mississippi drainage, there are many large species which, before the advent of plastics, were the major source of pearl buttons.

Land Varieties.—Most of the land shells are pulmonate gastropods, that is, snails that have a modified lung, and they include the garden and woodland snails and the shell-less slugs. A few small species are gill-bearing, operculated prosobranch snails. Many of the land shells are as highly colored and as attractively designed as the most popular of the sea shells. Numerous species, reaching two or three inches in size, dwell among the branches of high trees, such as the Philippine *Obba, Helicostyla,* and *Amphidromus* snails and the brightly colored *Liguus* tree snails of southern Florida and Cuba. The *Polymita* bush snails of Oriente Province, Cuba, have the artificial appearance of having been painted in bright shades of red, orange, yellow, and black.

Largest of the land shells are the giant African snails of the genus *Achatina.* The largest species lives in the rain forests in the western part of French Equatorial Africa, and its shell reaches a length of eight inches, while the extended foot upon which the snail crawls may stretch to over 12 inches in length. This snail is roasted and eaten by the natives. About half as large is the giant east African snail (*Achatina fulica*) which after World War II caused considerable alarm among agriculturalists in many of the western Pacific islands because of the damage it caused to garden plants. This prolific snail was carried by man first to the island of Mauritius sometime before 1800, to India in 1857, to the East Indies prior to 1927, and was finally spread, mainly by the Japanese, to Formosa, the Ryukyu Islands, and Micronesia during the 1930's and 1940's. It is now established in the Hawaiian Islands, but as late as 1956 had not entered continental United States where, however, climatic conditions would not favor its survival.

The woodlands of North America contain many hundreds of interesting land shells most of which, however, are rather small and drab in color. The species inhabiting the mountainous areas are generally quite different from those living in the coastal regions, and a further faunal difference is evident between those of the western and eastern parts of the United States. Most of these snails prefer damp, shady areas where there is a certain degree of calcium carbonate in the soil and rocks. About 40 kinds of European snails and land slugs have been accidentally introduced into America, and of special note is one of the French edible snails (*Helix aspersa*) which is a considerable nuisance in California gardens.

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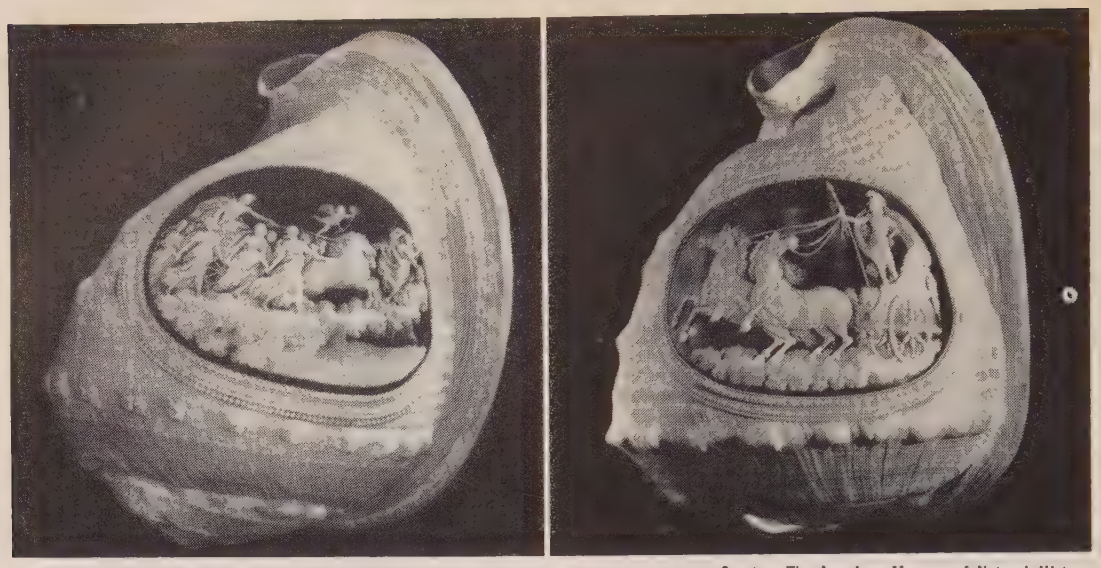
SHELL CAMEOS are the kind of cameos that are carved in bas-relief on specially chosen shells, in contrast to the commoner gem cameos which are engraved in bas-relief on precious or semi-precious stones like onyx. In shell cameo work the artist uses the shells of mollusks, conches and the like. These shells have a softer working surface than minerals, though their durability is much more limited. Even in antiquity artists made cameos by using shells on which they engraved either portraits or scenes from battle, hunting, or religious observance. The preferred shells were helmet-shaped mollusks and conches, such as the *black helmet,* the *horned helmet,* the *pink-queen's conch,* and the *pearly nautilus.* All these are shells in which layers of different colors occur, so that very beautiful effects are obtained by carving the artistic picture into one or more colored layers upon a ground with a contrasting color.

History.—It is believed that shell cameos originated in Mesopotamia and Egypt. Greek and Roman writers cursorily mention Egyptian and Babylonian specimens, which they ascribe to the 4th millennium B.C., but none of these have survived. Probably the earliest artistically carved

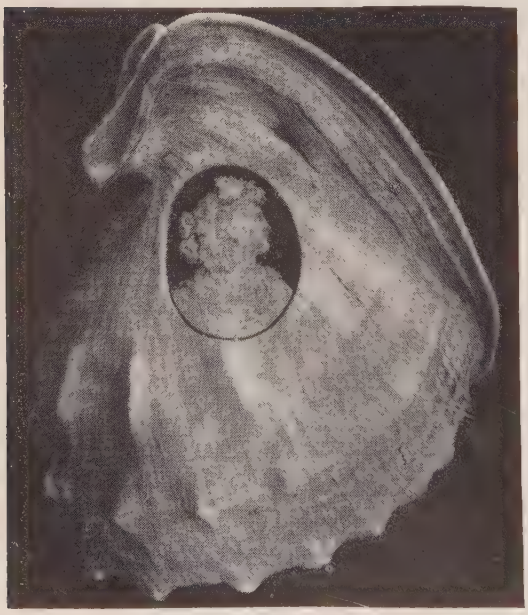


Courtesy The American Museum of Natural History

Shell cameos. *Left:* Guido Reni's "Aurora." *Right:* Phoebus in his chariot. Carved in Italy.

example known to us is the *Triducna Squamata* shell in the British Museum, London, said to be of Phoenician workmanship, 6th or 7th century B.C. In Greek and Roman times, shell cameos were well known in upper class circles, but only a few antique specimens have come down to us. This scarcity cannot with certainty be explained. Perhaps the costly shells were not in wide popular demand, or perhaps, if they were plentiful, they were discarded when the ravages of time marred their beauty and integrity.

When the Roman Empire disintegrated and all the fine arts died from neglect, the shell cameo art was no exception. Not until the Italian Renaissance was there a revival of interest in the cameo form of art objects. By the 16th century, the craft of shell cameo-making had again begun to flourish, both in the Italian and in the French and Flemish cities. Shell cameos continued to be made in Italy and France until the end of the 17th century, when the demand died out. Most 16th century shell cameos show some deterioration, but the world's leading museums contain a fair number of Renaissance examples. A majority of these cameo pictures are found on helmet-shaped conches, on pearly *Meleagrina* shells, and on the nautilus shell. The big helmet-like cameos were used to decorate libraries, and reception rooms. The smaller pearly cameos were tastefully framed and worn as wristbands, earrings and necklaces.



Courtesy The American Museum of Natural History

Cameo shell, or helmet shell. *Cassis madagascariensis.*

A cameo made from shells was perhaps too crudely elemental to suit the formal 18th century taste. Anyhow, the 18th century preferred gem cameos to the shell variety. The 19th century took to shells again and created a demand for them among the less opulent classes. For a time, shell cameos in the form of brooches, etc. became the fashion for personal adornment. The demand for the big, unframed shell cameos, popular in the Renaissance, was not revived. However, connoisseurs now began to collect the older shells, and this new hobby led to a startling rise in the price of the finest antique and Renaissance specimens. When the English Marlborough Collection was dispersed in 1899, a shell Laocoön cameo, cut by the famous Flamingo in the 17th century, sold for £335.

Examples.—New York has two splendid cameo collections, each containing a few rare examples of cameos cut from shells. The famous Morgan Collection is in the American Museum of Natural History, and the Milton Weil Collection, one of the world's finest, is in The Metropolitan Museum of Art. The Morgan Collection includes two wonderful Renaissance shells for interior display, one being a copy of Guido Reni's *Aurora,* cut on a Madagascar helmet shell, while the other, made of a similar shell, gives a picture of Actaeon surprising an angry Diana with her nymphs. The Milton Weil Collection, which is surpassed only by the great public collections in London, Paris,

and Vienna, contains eight rare shell cameos from the 16th, 17th and 19th centuries. The eight specimens include a wristband, earrings, a necklace, and a badge, all engraved on "bull's mouth" shells. The necklace consists of 10 shell cameos in gold filigree, done by Italian Renaissance craftsmen. The Badge of the Order of St. Michael, which shows a picture of St. Michael overcoming Satan, is a very rare 17th century piece of workmanship. There is also a 19th century cameo shell, displaying a profile bust of George Washington, signed Michelini, a noted French 19th century craftsman.

Technique.—In the May 1913 issue of the *American Museum Journal,* L. P. Gratacap, assistant curator of the American Museum of Natural History, gives a standard description of the technique of shell cameo carving. The process consists of six principal steps: (1) The selection of shells which are desirably clear, firm, and colorful. (2) With a revolving tin wheel, the artist cuts from a selected shell a piece suited in shape and size to the measurements of his design. (3) After the removal of all imperfections in the shell, its outer edge is cut into an oval, square, or oblong form. (4) The next step is to clean the shell surface and, with the aid of a graving tool, or burin, to engrave a specific sketch. (5) The artist, using pumice burnishers and oil, now proceeds to deepen and variegate the color effects. (6) The acid is then quickly removed, to prevent chemical corrosion from spoiling the smoothness, radiance, or harmony of the design. The Italian shell engravers were microscopic experts. The 16th century shell cameo, *Ganymede,* now in the British Museum, reveals an artistry in minute detail that equals the best detail work on cameos cut in precious stones.

FELIX GRENDON.

SHELL MONEY. See WAMPUM.

SHELL POINT, unincorporated community, California, in Contra Costa County. This tract of land (631 acres), located on the Suisum Bay, is owned by the Shell Chemical Corporation. Prior to 1930 the tract was known as Stake Point but with the purchase by Shell Chemical, the community was referred to as Shell Point. On the acreage is manufactured anhydrous ammonia and ammonium sulphate. Pop. (1950) 4,674.

SHELLABARGER, Samuel, American educator, biographer, and historical novelist: b. Washington, D.C., May 18, 1888; d. Princeton, N. J., March 21, 1954. From relatively obscure achievements as an author, he moved in the last decade of his life into best-selling popularity.

He was educated at Hill School, Pottstown, Pa., and at Princeton University, from which he was graduated in 1900. After studying for a year in Munich, he returned to Princeton to spend two years as an instructor in English. After World War I, he resumed teaching at Princeton, this time as assistant professor of English, with a Ph.D. gained at Harvard University in 1917. He served in World War I as first lieutenant of Military Intelligence, attached to the United States legation in Stockholm. Shellabarger returned for four more years at Princeton, leaving in 1923 to begin several years of preparation for authorship in the historical field, with Lausanne, Switzerland, as his headquarters.

While he traveled widely through Europe, he specialized in research concerned with the Renaissance and with 18th century European history. First results were the scholarly biographies, *The Chevalier Bayard: A Study in Fading Chivalry,* published in 1928, and *Lord Chesterfield,* which followed seven years later (republished in 1951 as *Lord Chesterfield and His World*). Both works received only mild critical acclaim, as did a first novel, *The Black Gale,* published in 1929. Under the pseudonym John Esteven, Shellabarger published mysteries at the rate of one a year for several years, beginning with *The Door of Death* (1928). A romance, *Grief Before Night* (1938) was published under the pseudonym Peter Loring. He returned in the latter year to the academic world, becoming headmaster of the Columbus (Ohio) School for Girls until 1946, but continuing his literary researches and the habit of a steady daily production quota, in longhand, on works of "reconstructive imagination."

Captain from Castile, product of three years' study of Spanish source material dealing with the conquest of Mexico, was sold in 1944, for motion picture production, before publication. It was translated into 18 languages, including Pakistani and Turkish. *Prince of Foxes,* a sweeping Renaissance tapestry, published in 1947, also became a motion picture. *The King's Cavalier* (1950) and *Lord Vanity* (1953), the latter also sold to the motion pictures, were likewise immensely popular.

Besides those already mentioned, Shellabarger's works included the mysteries, *Voodoo* (1930), *By Night at Dinsmore* (1935), *While Murder Waits* (1936), *Graveyard Watch* (1938), *Blind Man's Night* (1938), and *Assurance Double Sure* (1939); and the romance, *Miss Rolling Stone* (1939), published under the name of Peter Loring.

SHELLAC. See LAC; LACQUER AND LACQUERWORK.

SHELLEY, shĕl'ĭ, **Harry Rowe,** American organist and composer: b. New Haven, Conn., June 8, 1858; d. Sept. 12, 1947. He studied music with Carl Stoeckel, and afterwards under Dudley Buck, and Anton Dvořák. He completed his studies in Paris and London, and for 10 years from 1899 was organist at the Fifth Avenue Baptist Church, New York City. Thereafter for 20 years he was at Central Congregational Church, Brooklyn, N. Y. Among his compositions are the cantatas *Death and Life, Vexilla Regis,* and *The Inheritance Divine; Santa Claus Overture;* the orchestral suite *Souvenir de Baden-Baden,* and two symphonies, a violin concerto, songs, and organ pieces.

SHELLEY, Mary Wollstonecraft Godwin, English writer: b. London, Aug. 30, 1797; d. there, Feb. 21, 1857. She was the daughter of William Godwin and Mary Wollstonecraft. In 1814 she eloped with the poet Shelley to Switzerland, and after the death of his wife, Harriet Westbrooke, was married to him. While traveling with him she composed her famous romance of *Frankenstein* (1818), which excited an immense sensation. After her husband's death she devoted herself much to literary work, producing *Valperga* (1823); *The Last Man* (1826); *Lodore* (1835); *Falkner* (1837); and other works of fiction; biographies for the *Cabinet Cyclopaedia; Journal of a Six Weeks' Tour,* with Shelley (1814); *Rambles in Germany and Italy* (1844); and

an edition of Shelley's poetical works and miscellaneous writings. (See FRANKENSTEIN). Consult Marshall, Mrs. Julian, 'Life of Mary Wollstonecraft Shelley' (London 1889).

SHELLEY, Percy Bysshe, English poet: b. Field Place, near Horsham, Sussex, 4 Aug. 1792; d. by drowning in the Bay of Spezzia, on or after 8 July 1822. He was the eldest son of Timothy, afterward Sir Timothy, Shelley, a not over-intelligent country gentleman, and grandson of Sir Bysshe Shelley, who was something of an adventurer, handsome, clever and graceless. His mother, Elizabeth Pilford, seems to have handed on to him her beauty and her fondness for writing. After some tutoring he was sent to Sion House Academy, at Brentford, a middle class school, where his shyness and delicacy exposed him to brutal bullying. His biographers seem right in dating from this period his hatred of tyranny and resistance to all forms of oppression. He seems also to have developed his faculty for musing, for scientific speculation and for wide reading, especially at this time in the wild romances of Mrs. Radcliffe and others of her class. On 29 July 1804 he entered Eton where he remained for five years, developing along the lines just described. His tutors were not calculated to inspire his respect and thus could do little or nothing to check his extravagant and abnormal tendencies; nor could the outrageous fagging to which he was subjected fail to be deleterious to so sensitive an organization as his. He was nicknamed «Mad Shelley,» lived as much apart as he could, dabbled in chemistry, haunted romantic spots, read widely — acquiring a taste for the classics, — and found some consolation in the society of Dr. James Lind (later represented as the hermit in 'The Revolt of Islam' and as Zonaras in 'Prince Athanase'), an elderly physician of scientific and eccentric tastes, who was apparently more sympathetic than discreet in his relations with a youth in need of guidance. As was natural, the precocious boy soon began writing and before he was 17 had composed a Radcliffian romance, 'Zastrozzi,' as well as some immature poetry — e.g., parts of the 'Wandering Jew' written in conjunction with his cousin and future biographer, Thomas Medwin, who had also been with him at Sion House. Perhaps more important for his future was his interest in serious writers both practical and theoretical, Franklin, Pliny, Condorcet, who strengthened his native bent toward inquiry and were in part responsible for his early abandonment of religious orthodoxy.

Shelley left Eton, with somewhat unexplained abruptness, in the summer of 1809; he matriculated at University College, Oxford, 10 April 1810. From the amount he published in the latter year it would seem that he spent much of the interim in writing, and it is known that he had a love affair with a cousin, Harriet Grove. At Oxford he formed a friendship with the able, rather cynical Thomas Jefferson Hogg, and was encouraged in his wholesale recalcitrancy. The university was little hospitable to advanced ideas, and when Shelley sent to bishops and heads of colleges, copies of his syllabus of arguments demonstrating 'The Necessity of Atheism,» it was small wonder, though a great pity, that, on his failure to answer their questions, the authorities should have handed him a sentence of expulsion already signed and sealed. (25 March 1811). Hogg protested and was also expelled.

The offending pamphlet was Shelley's sixth publication, and he still lacked several months of being 20. In 1810 he had published — how, is something of a mystery — 'Zastrozzi'; 'Oriental Poetry by Victor and Cazire' (written in conjunction with his sister Elizabeth, withdrawn on the ground that she had borrowed from «Monk» Lewis, long sought for in vain, but finally edited by Dr. Richard Garnett in 1898); 'Posthumous Fragments of Margaret Nicholson' (the mad woman who had tried to kill George III); and 'Saint Irvyne; or, the Rosicrucian,' another Radcliffian romance. It is needless to say that these productions are devoid of intrinsic merit. His fifth publication was 'A Political View of the Existing State of Things,' issued anonymously at Oxford for the benefit of Peter Finerty, a prisoner for libel. This has entirely disappeared.

Shelley left Oxford with mingled regret and indignation and took lodgings in London. His affair with his cousin Harriet Grove had been broken off, and he was soon involved in the most unhappy entanglement of his much entangled life. Not being permitted to come home unless he would break with Hogg and refusing to do this, he found himself adrift in London, and fate brought him in contact with a friend of his sister Elizabeth's, Harriet Westbrook, the pretty daughter of a retired hotel-keeper. She was romantic and fancied herself persecuted by her family; Shelley was also romantic, and persecuted, and quixotic, and inflammable. When he went out of town in July 1811 she wrote him pitiful letters, which so worked upon his feelings that he returned to London, ran away with her and married her at Edinburgh at the end of August. How far the girl's relatives connived at the capture of the baronet's son cannot be ascertained. Naturally the Shelleys were indignant, and cut off the madcap's allowance; but Mr. Westbrook allowed them £200 a year, and finally Shelley's father contributed the same amount.

It is unnecessary to detail their movements at this juncture save to say that they spent some months at Keswick near Southey and then, Shelley being inspired by the theories of William Godwin (q.v.), they went over to Ireland to attempt to redress the wrongs of the long-suffering people. They were accompanied by Harriet's sister, Eliza Westbrook, whose presence grew distasteful to Shelley, and they remained only about two months, since the Irish did not respond enthusiastically to Shelley's pamphlets. He was merely a visionary a little ahead of his times, for Catholic emancipation came peacefully not so many years after his death. When he returned to England, he excited the attention of the government by revolutionary writings, but he was not molested. Believing, however, that an attempt had been made to assassinate him, he returned with his wife and sister-in-law to Ireland, and then he went with Harriet to London, where their first child was born (June 1813). About this time he printed privately his nebulous poem of freethought 'Queen Mab,' accompanied by notes and a «vindication» of vegetarianism to which he had become a convert. Eight years later a pirated edition brought 'Queen Mab' into notoriety, much to its author's disgust. A dia-

logue pamphlet, 'A Refutation of Deism' (1814), followed, bringing his publications up to the number of 14. Meanwhile he and Harriet had become estranged, partly no doubt from natural incompatibility, partly from Shelley's instability, to use no stronger term. Critics and readers will probably never agree to the exact distribution of responsibility between the unfortunate pair; but it seems manifest that admiration for Shelley's genius has unduly influenced many of his biographers in their treatment of the matter. He met Mary, the daughter of William and Mary Wollstonecraft Godwin, and, as before with Harriet, found an attractive girl pining for sympathy at a time when he himself stood in need of it. She was a much more congenial partner for him than the inkeeper's daughter, to whom he had just been remarried according to the rites of the Church of England, and after Harriet made the mistake of leaving him and going with her child to her father's at Bath, he lost little time in persuading his new 17-year-old friend to elope with him.

They left England on 28 July 1814 taking with them Jane (Claire) Clairmont, a daughter of Godwin's second wife by a former marriage. They spent some time in Switzerland and then, after some financial difficulties, returned to England in September. Their experiences were later recounted by Mary Shelley in 'The History of a Six Weeks' Tour' (1817). Meanwhile Shelley had made Harriet the astounding proposition that she should live with him and Mary, and after his return to England he saw her and the son she had borne him during their separation. No reconciliation was affected, however, and Shelley naturally found himself cut off from all his former sources of income. The death of his grandfather early in 1815 induced his father to allow him £1,000 a year in order to guard against his encumbering the family estate. He settled £200 a year on Harriet, took a house near Windsor Forest wrote 'Alastor' (1816, a poem still immature in thought, but indicating a great advance in his command of poetic technic), and studied the classics. In May 1816 he went again to Switzerland with Mary and Jane Clairmont, and there he came under Byron's (q.v.) sway, exerting in his turn a strong influence upon his new friend. The autumn found Shelley back in England established at Great Marlow. Here, in December 1816, he learned of Harriet's suicide in the Serpentine. The immediate causes of the act are obscure; but, whether or not the charges that have been made against Harriet's morals during the closing months of her life are fully or partially justified, it seems absurd to acquit Shelley of all responsibility for her tragic fate.

He was now free to marry Mary Godwin (30 Dec. 1816) but the law would not allow him to recover the control of his two children by Harriet. Shelley resented Lord Eldon's decision, with some justice so far as the management of their education was concerned; yet he had certainly so conducted himself as to make the Chancellor's decision seem equitable to most people at the time. Meanwhile a son, William, had been born to him and Mary, Leigh Hunt had become a friend, and Keats an acquaintance, and the elaborate narrative and allegorical poem 'Laon and Cythna' had been begun. Two political tracts were also published and, true to the humanitarian principles that always actuated his conduct, even when its effects were deleterious to others, Shelley ministered to the sick and needy around him. His charity seemed boundless, and during his visitations he contracted a bad case of ophthalmia. His health had been otherwise poor and, as for many reasons England was not a congenial dwelling-place, he determined to go to Italy. He left England with his family, and by the end of March 1818 was at Turin. Two months previously Ollier had reissued under the title of 'The Revolt of Islam,' the long poem, which on its first appearance, had been entitled 'Laon and Cythna.' The relationship between the hero and heroine had been too close to suit any save the most emancipated readers, and Shelley had reluctantly made a few alterations, in the interest not so much of conventionality and the success of the poem as a plea for the cause of oppressed peoples. No changes could make so long and misty a performance popular; but lovers of poetry will always find 'The Revolt of Islam' incomparable for its glowing pictures and its exquisite melodies. Both in its merits and in its defects it reflects as though it were a mirror, its author's unique, attractive, yet singularly incomplete and unbalanced genius.

The first months in Italy were spent at Lake Como, Milan and the Baths of Lucca, and saw the completion of the romantic poem 'Rosalind and Helen' and the translation of Plato's 'Symposium.' Then Shelley with Jane Clairmont took a disagreeable journey to Venice to see Byron with regard to Miss Clairmont's illegitimate daughter Allegra. (See Byron). The poem 'Julian and Maddalo' commemorates some features of the visit. Byron loaned Shelley a villa at Este, and the latter at once sent for his family. A few weeks later Mary's second child, Clara, died at Venice. Returning to Este, Shelley began 'Prometheus Unbound' and, charmed by the scenery, wrote the first draft of his beautiful 'Lines Written Among the Euganean Hills.' The winter of 1818–19 was spent at Naples, which inspired, among other things, the 'Lines Written in Dejection,' and a magnificent ode to the beautiful and oppressed city. He also wrote to his friend, Thomas Love Peacock, letters justly famous for their powers of description and admirable prose style. The spring of 1819 found him settled in Rome hard at work upon what is often regarded as his greatest achievement, the aspiring but somewhat nebulous lyrical drama, 'Prometheus Unbound,' published in 1820. Immediately after this he wrote the much more realistic tragedy entitled 'The Cenci,' probably the least subjective of his works, which was composed and published at Leghorn in 1819 Shortly before he left Rome in the summer his son William sickened and died. The well-nigh heart-broken parents retired to Leghorn and then to Florence, where another son, afterward Sir Percy Florence Shelley, was born. Here in October Shelley wrote that splendid poem, probably the most nobly imaginative of all his lyrics, the 'Ode to the West Wind,' as well as two of his less successful, posthumously published poems, the parody 'Peter Bell the Third' and 'The Masque of Anarchy,' inspired respectively by Wordsworth's famous

poem and by the infamous Manchester Massacre.

The beginning of 1820 saw the wanderers established at Pisa, where Shelley's health began to improve. Several English friends, the Gisbornes and the Williams, and later Lord Byron and the traveler, Trelawny, added to the attractions of the place and stimulated Shelley's genius, if not to the production of any elaborate poems of consequence save 'Adonais' and 'Hellas,' at least to the writing of some of his most beautiful lyrics and charmingly familiar pieces. Among the poems of 1820 were the 'Epistle to Maria Gisborne,' the fantastic 'Witch of Atlas,' the exquisite 'Sensitive Plant,' and those matchless lyrics of their kind, 'The Cloud' and the 'Ode to a Skylark.' The chief productions of 1821 were the Platonic 'Epipsychidion,' the final form of which was inspired by an idealistic passion Shelley conceived for Emilia Viviani, an Italian girl confined in a convent against her will, the delightful and eloquent 'Defence of Poetry' (in prose), the immortal elegy on Keats, 'Adonais' (Pisa 1821), and 'Hellas,' a lyrical drama reflecting the emotions kindled in its liberty-loving author by the Greek revolution. The last-named piece, in some of its choruses at least, gives evidence of such maturing powers that, when we take into account the range of Shelley's interests, mental and emotional, we find it difficult to set limits to his possible achievements if he had been permitted to live and had developed as steadily and as rapidly as he did during the closing years of his short life. It is true that 'Epipsychidion,' despite its marvelous beauty of description and its intensity of spiritual passion, shows that Shelley's idealism was still capable of giving an unwholesome turn to his writings and, to put it mildly, a fatuous twist to his conduct. It is true also that the part Shelley took in luring Leigh Hunt to Italy to start 'The Liberal' (see HUNT, J. H. L., and BYRON) scarcely argues a great increase in worldly wisdom, though it speaks volumes for Shelley's generosity. But, when all deductions are made, the development and the promise of Shelley's 28th, 29th and 30th years are scarcely less remarkable than the development and promise of Keats in the marvelous year of his great odes and 'Lamia.'

In 1822 Shelly began a drama on Charles I, but did his best work on translations from 'Faust' and Calderon's 'Mágico Prodigioso' and on the highly imaginative 'Triumph of Life,' unfortunately left incomplete. In April the Shelleys went with the Williamses to Lerici, and there the friends passed an ideal time until the arrival of the Hunts drew the kind-hearted Shelley early in July to Leghorn and Pisa to look after their comfort. On 8 July he began his return journey with Williams in the yacht *Ariel*, which they owned jointly. Trelawny watched them sail away, saw a squall come up and, when it was over, could catch sight of them no more. His suspicions that all was not well were allayed for a time; but, as the days passed, every one interested in the two voyagers lost hope. On 18 July Shelley's body — if the copies of Sophocles and Keats found in the pockets definitely marked it as his — was washed ashore near Via Reggio. It was first buried in the sand, then cremated — save the heart which would not burn — and the ashes were buried in the Protestant cemetery at Rome (7 Dec. 1822) under the pyramid of Caius Cestius and near the grave of Keats. There seems to be little reason to credit the notion that the yacht was designedly run down.

Shelley is said to have been tall and slender, very youthful in appearance, with a fair complexion and dark blue eyes full of artless wonder. Trelawny at first sight almost took him for a girl. His receptivity, gentleness, charity and other exquisite traits suggest the woman as did his appearance; but his fiery hatred of oppression and shams, his calm defiance of public obloquy, his power to charm men of the world forbid us to regard him as in any sense effeminate. In his writings no less than in his character and in his appearance this blending of essentially manly and essentially womanly characteristics is perceptible. His ideals were passive rather than active; his most indisputably successful poems are in theme and tone expressions of longing, weakness, pain and sadness; his best descriptive passages are hazy; his verse is fluid and melodious rather than deeply harmonious. On the other hand, he has had the power to inspire strong souls with his ideals; more than any other of our poets he has caught the Greek secret of endowing with life mythical figures and conceptions; he was a scholar, a critic, a man of taste and a prose-writer of no mean order; his genius was varied and copious beyond that of most of his contemporaries. With regard to his final rank in English literature no consensus of opinion seems attainable. While the public indifference that depressed him in his own day has long been overcome, he has never attained true popularity either at home or abroad, and his critics are only too likely to become his worshippers or else to display too openly a feeling of hostility toward his life and works. He is still too much the idol of advanced spirits and of people who are inclined to be a trifle exquisite in their literary tastes and somewhat supercilious with regard to the tastes of others. His position as a great poet is scarcely open to question, but his position as a genuine classic in the fullest sense of the term is surely doubtful so long as Matthew Arnold and other qualified critics dissent from the praise of his ideals, the defense of his conduct, and the enthusiasm for his elaborate poems such as 'Prometheus Unbound' to be encountered in extravagant measure in the books and essays of his admirers. Perhaps it is safe to conclude that, while his conduct must be censured in many particulars, his character must be pronounced singularly winning and lovable, and, that, while his elaborate poems, though wonderful, are not sustained works of art, his genius as a lyrical poet is in range and quality unique and extraordinarily high. See ADONAIS; CENCI, THE; ODE TO THE WEST WIND; PROMETHEUS UNBOUND; QUEEN MAB; TO A SKYLARK.

Bibliography.— Various volumes of Shelley's poems, imperfect and in some cases pirated, helped to spread his small reputation until 1839, when Mrs. Shelley published an edition of his works in four volumes. Many important poems and letters have since been published — e. g., in Richard Garnett's 'Relics of Shelley' (1862). The most complete edition of the works in verse and prose is that by H. B. Forman (8 vols., 1876–80). There are good editions of the

poetry by H. Buxton Forman (London 1892), E. Dowden (London 1893), G. E. Woodberry (Boston 1901), and T. Hutchinson (Oxford 1904). The prose works have been edited by R. H. Shepherd, 2 vols. (London 1888), and selections of Shelley's letters have appeared, including those edited by S. C. Hughson (Chicago 1892), R. B. Johnson (London 1929), and volumes 8 to 10 of the complete works edited by Roger Ingpen and Walter E. Peck, 10 vols. (London 1926–1930). Consult earlier lives by Leigh Hunt, T. J. Hogg, 4 vols. (London 1858), E. J. Trelawny (Boston 1858), and T. Medwin, new ed. (London 1913); and the biographies by J. A. Symonds (New York 1894), E. W. Edmunds (New York 1922), E. Dowden, new ed. abridged from the original 2 vols. (London 1932), and Humbert Wolfe, 2 vols. (London 1933), recapitulating the lives by Hogg, Trelawny, and T. L. Peacock; special studies by O. W. Campbell (*Shelley and the Unromantics,* New York 1924), André Maurois (*Ariel,* New York 1924), and E. Carpenter and G. Bornefeld (*Psychology of the Poet Shelley,* New York 1925); and critical essays, especially those by Matthew Arnold, Walter Bagehot, Edward Dowden, Richard Garnett, Leslie Stephen, and George E. Woodberry.

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SHELLEY'S CASE, Rule in, a rule declared by the courts of England late in the 16th century. By this rule when an estate of freehold is acquired by gift or purchase by an ancestor, with remainder to his heirs or the heirs of his body, the word "heirs" is a word of limitation and not of purchase; that is, the ancestor takes the estate in fee or in tail, according to circumstances, and the heirs take nothing. The rule has been repealed or amended by statute in most jurisdictions in the United States, and it was abolished in England and Wales by legislation effective Jan. 1, 1926.

SHELTER ISLAND, N. Y., island and township, Suffolk County; situated at the eastern end of Long Island between Peconic and Gardiners bays; length, eight miles; width, four. It is connected with the mainland and the Long Island Railroad by ferry to Greenport. The island was originally owned by the Manhasset Indians; was acquired by Lord Sterling, and during colonial times belonged to the jurisdiction of Connecticut. The coast line is irregular and deeply indented with small bays and inlets, affording good harbors for yachts and small craft; there are excellent facilities for pleasure boating and fishing, and the island is a popular summer resort. There is a monument to the Quakers who sought refuge here in 1652. Pop. (1950) 928.

SHELTON, Don Odell, American evangelist and editor: b. Odessa, N. Y., May 5, 1867; d. Briarcliff Manor, N. Y., Jan. 29, 1941. He was secretary of the East Side Branch of the Young Men's Christian Association in New York in 1889–1899, and in 1906 became president of the National Bible Institute, New York. He founded the *Bible Today,* and in 1909 became editor of the *Message.* Author of *Personal Work and the Personal Worker* (1896); *Public Use of the Bible* (1898); *Christianize America* (1903); *The Prayer that Changes Things* (1915).

SHELTON, Thomas (fl. 1612–1620), translator into English of Cervantes' *Don Quixote* (*Don Quijote de la Mancha*), part one appearing in his translation in 1612, and part two in 1620. Both parts were translated from editions published in Brussels. Shelton's translation has been highly prized among English versions of the book because of the liveliness and vigor of his language.

SHELTON, Conn., town in Fairfield County; alt. 120 feet; on the Housatonic River; 14 miles north of Bridgeport; on the New Haven Railroad. Industries are drop forge products, crucibles, sponge rubber products. Pop. (1950) 12,269.

SHEM, the eldest son of Noah; according to the Mosaic account, he is the father of all the nations that inhabited southwestern Asia (Gen. 10:21-31), a territory inclusive of Syria, Chaldaea, parts of Assyria, of Persia, and of the Arabian peninsula. Hence the inhabitants are called Semites, and their language and civilization styled Semitic.

SHEMAIAH, shĕm-â-ī'ŭ, (Heb. God has heard), a name of various Old Testament prophets and priests, including the Shemaiah who with Abtalion taught Hillel, "The Babylonian," head of the Sanhedrin during part of the reign of Herod.

SHEMAKHA, shĕ-mä-kä', town in Azerbaijan Socialist Soviet Republic on the Zagolovai, about 63 miles northwest of Baku. It is situated in the midst of mountains, on verdant slopes and was once a commercial center. It has, however, suffered from earthquakes, and one in 1902 almost destroyed it. Silk manufacture is the chief industry. Shemakha's history from 1712 was one of almost continuous warfare; it was captured and occupied in turn by various Persian, Turkish and Russian commanders. On Ptolemy's map it is set down as Kamachia. Pop. (1939) 3,651.

SHENANDOAH, shĕn-ăn-dō'à, Iowa, city in Page County; on Nishnabotna River; 58 miles southeast of Council Bluffs, on the Chicago, Burlington and Quincy; and the Wabash railroads. There are seed firms, railroad repair shops, packing houses, and manufactures of stock powder, husking pegs, creamery products, beverages, confectionery, and thumb stalls. The largest nurseries in the West are located at Shenandoah. Pop. (1950) 6,938.

SHENANDOAH, Pa., borough in Schuylkill County; alt. 1,300 feet; on the Reading System; Lehigh Valley; and Pennsylvania railroads; 12 miles north of Pottsville. The borough lies in a valley, in the richly yielding anthracite coal country. Mine chambers beneath the city sometimes cave in, opening cracks in a city street, or causing the displacement or collapse of a wall or building. There are meat packing plants and textile mills in the city; the mining of hard coal, however, is the principal industry. There is some trade in produce from the farms in the surrounding area; this consists principally of dairy products and truck crops.

Settlement was made on the site as early as 1835, but it was not until the coal deposits were first exploited in 1862 that the borough's real development began. In that year the townsite was platted, and in 1866 the borough was incorporated. In 1883, Shenandoah was almost completely destroyed by fire. Government is administered, as is common in Pennsylvania boroughs, by burgess and council; they are elected by popular vote. The borough's water supply is municipally owned; its power and light system is privately controlled. Pop. (1950) 15,704.

SHENANDOAH, shĕn-ăn-dō'ȧ, a river in Virginia which has its source in Augusta County, and flows northeast, on the west side of and nearly parallel to the Blue Ridge. It enters the Potomac at Harper's Ferry, W. Va. Its total length is about 170 miles. It flows rapidly over nearly all its course and furnishes extensive water power which is used for manufacturing and has contributed greatly toward the industrial prosperity of the valley. The valley of the Shenandoah was the scene of many stirring engagements of the Civil War.

SHENANDOAH, The, a ship named after the Shenandoah River, Virginia, bought by the Confederate States during the American Civil War (1861–1865), and placed in commission as a privateer during the last year of that war. The *Shenandoah* was built in Glasgow in 1863; she was intended for the Far Eastern trade but was purchased by the Confederates in 1864 and in October of that year was commissioned as a privateer. The ship, named the *Sea King,* had sailed from London for Madeira, where she received her privateersman's crew, composed mostly of officers from the *Sumter,* the *Alabama,* then destroyed, and the *Georgia,* and common sailors, under the command of Capt. James I. Waddell. The *Shenandoah* sailed from Madeira and circumnavigated the globe, via Melbourne, being the only Confederate vessel to do so. In the course of her career she captured or destroyed 39 of the enemy's vessels, valued in the aggregate at about $2,000,000. Her last action, the last hostility of the war, was on June 28, 1865, about three months after the war had ended, when the *Shenandoah* appeared among the American whalers near the Bering Straits and captured 10 vessels before nightfall. On August 2, Captain Waddell learned from an English bark of Lee's surrender, five months before. He sailed at once to Liverpool and delivered his ship to the British man-ŏf-war *Donegal,* never having been captured nor defeated in his entire career. The British government released all of the crew not British-born and turned the vessel over to the American consul.

SHENANDOAH MOUNTAINS, a range in Virginia, belonging to the Alleghenies, extending from Bath County, Va., about 80 miles northwest, partly along the state line, into Hardy County, W. Va. The range forms the western boundary of the Shenandoah Valley. The highest point is over 4,400 feet, just west of Harrisonburg, Va.

SHENANDOAH VALLEY, Virginia, between the Shenandoah Mountains on the west and the Blue Ridge Mountains on the east. It is noted for its surpassing beauty, for the magnificent caverns in it, and as an agricultural region, being one of the most fertile sections of the state. Around Winchester, it is famous for its apple orchards, and here each spring is held the "Apple Blossom Festival," which attracts thousands. Other towns in the valley include Staunton and Harrisonburg. For an account of the battles fought in the valley during the Civil War see article following.

SHENANDOAH VALLEY, Military Operations in. At the beginning of the Civil War the Shenandoah Valley was the garden spot of Virginia, full of grain and hay and teeming with livestock and other supplies essential to the Confederates. It became the beaten track and alternately the camping ground of both armies, witnessed much brilliant strategy and many hard fought battles, and at the close of the war was a scene of desolation. Its topography favored the Confederates, since, as covered on the east by the Blue Ridge, it was the easiest route for threatening Washington and the most direct route for their armies to move into Maryland and Pennsylvania.

1861.—Virginia passed an ordinance of secession on April 17, and the next night state troops moving, without authority of the governor, from Staunton and other points in the valley, seized Harper's Ferry, with its arsenal, armory and munitions of war, the small United States guard abandoning the place and retreating to Carlisle, Pa. The town was speedily occupied by several Virginia regiments, and Col. T. J. Jackson put in command. Jackson was relieved by Gen. J. E. Johnston on May 23. Upon the dash of Col. Lew Wallace on Romney, June 13, and the approach of Gen. R. Patterson from Chambersburg to Williamsport, threatening his position, Johnston, on June 15, burned all the bridges of the Potomac from Harper's Ferry northward to Williamsport, abandoned Harper's Ferry and fell back to Winchester. On July 2, Patterson crossed the Potomac at Williamsport, occupied Martinsburg and, under General Scott's order, threatened Johnston at Winchester, to hold him there, while General McDowell advanced on General Beauregard at Bull Run; but on July 18 Johnston eluded Patterson and with 9,000 men marched through Ashby's Gap to Piedmont and took cars for Manassas.

The Union occupation of the lower valley was brief; Patterson, after Johnston had left the front, fell back to Harper's Ferry, where, on July 25, he was relieved by General Banks, when the Union troops, save a small guard at Harper's Ferry, were withdrawn to the Maryland side of the Potomac. Late in October Stonewall Jackson was assigned to the command of the Confederate forces in the lower valley, with headquarters at Winchester, and was reinforced by Loring's division from West Virginia. Jackson swept the few Union outposts from the fringes of the valley, broke the Baltimore and Ohio Railroad and Chesapeake and Ohio Canal in several places, as far westward as Hancock, and on Jan. 10, 1862 drove the Union forces from Romney and occupied it with Loring's division. By order of the Confederate secretary of war, January 31, Loring was withdrawn from Romney to Winchester, where Jackson remained during the rest of the winter, the Union forces again occupying Romney on Feb. 7, 1862, demonstrating on Winchester and sending expeditions southward to bring in cattle.

1862.—Active operations began in the valley late in February by the movement of two Union

divisions across the Potomac at Harper's Ferry and an advance on Winchester, near which Lander's division from Romney and the south branch of the Potomac joined the column. Manassas and Centreville were evacuated by Johnston on 8 and 9 March, and Jackson, with his 5,000 men, under Johnston's order, abandoned Winchester on the night of the 11th, as he was on the eve of giving battle to General Banks, and fell back up the valley 42 miles to Mount Jackson, followed by Shields' (formerly Lander's) division of Banks' corps. On the 20th Shields moved back to Winchester, followed by Jackson. Informed on the march that part of Banks' corps was being sent from the valley to reinforce McClellan east of the Blue Ridge, Jackson, in order to detain it in the valley, pressed Shields closely, skirmished with him on the evening of the 22d, and next day brought him to battle at Kernstown (q.v.), less than four miles south of Winchester, and being defeated, again retreated up the valley. His action had the desired effect; Williams' division, which was on the march through Snicker's Gap of the Blue Ridge, was recalled and Banks again pursued Jackson up the valley as far as Harrisonburg, 66 miles from Winchester. Jackson fell back to Swift Run Gap, in the Blue Ridge, on the road from Harrisonburg to Gordonsville, where he watched an opportunity to strike Banks in flank and rear should he advance from Harrisonburg to Staunton. Under President Lincoln's order Banks fell back to Strasburg, and Frémont, commanding a corps, was ordered to move from Franklin and Monterey to co-operate with Banks in an advance on Staunton. Jackson, informed of Frémont's advance, made a rapid movement from Swift Run Gap to Staunton and, pushing through that place on 5 May, engaged Frémont's advance, under Generals Schenck and Milroy, on the 8th, and in a hard-fought battle checked it, Schenck falling back to Franklin. (See McDowell, Irvin). Jackson followed to Franklin, found Schenck too strongly posted to attack and on the 12th began his return march to the valley to attack Banks. On the 19th he started from Mount Solon, near Harrisonburg, on the 21st crossed the Massanutton Mountains from New Market to Luray, and, joined by Ewell's division, swept down the Luray Valley, with over 16,000 men and 48 guns, defeated Colonel Kenly's command of 900 men at Front Royal (q.v.), 23 May, and pursuing, captured the most of it. This movement turned Banks' fortified position at Strasburg, and on the morning of the 24th Banks retreated northward on the valley pike, was struck in flank by Jackson at Middletown and Newtown, but foiled his efforts to intercept him, and after a running fight from Middletown to Winchester, halted on the night of the 24th at Winchester to give battle. On the morning of the 25th Jackson attacked Banks, who had about 7,000 men, defeated him and drove him across the Potomac at Williamsport. (See Winchester, Battle of). Jackson halted his main body a few miles beyond Winchester, but the cavalry followed Banks to the river. On the 28th Jackson sent part of his force toward Harper's Ferry, which made a demonstration, as though intending to force the position and cross into Maryland. Meanwhile Frémont and McDowell, moving respectively from Franklin on the west and Fredericksburg on the east, were converging on Strasburg, in Jackson's rear, to cut him off, upon which he abandoned his demonstration on Harper's Ferry and, starting from Winchester early in the morning of the 31st, by a rapid march slipped through the net prepared for him and arrived at Strasburg 1 June, Frémont's skirmishers being within a mile of the road over which he passed. Next day Frémont gave a stern chase on the valley pike, and Shields' division, now of McDowell's corps, marching by Luray Valley, endeavored to reach Jackson's rear or strike him in flank. Frémont pressed his rear closely in many sharp encounters, driving him steadily through Woodstock, Edenburg and Mount Jackson; but Jackson, avoiding a general engagement, when arriving at Harrisonburg, sent his sick and wounded to Staunton, and 6 June, turning to the left, marched toward Port Republic. Later in the day his rear guard had an encounter with Frémont's advance near Harrisonburg (q.v.), in which Gen. Turner Ashby, a gallant Confederate cavalry commander, was killed, and the result of which was that Frémont's advance was repulsed. Frémont advanced in force from Harrisonburg on the morning of the 8th, and at Cross Keys (q.v.) was met by Jackson, who, after a severe fight, repulsed him. Leaving Ewell's division to resist Frémont, should he renew the fight next morning, Jackson marched the rest of his army to Port Republic to meet Shields, who was moving up Luray Valley, and whose advance, under Colonel Carroll, had dashed into Port Republic on the morning of the 8th, was driven out and joined later in the day by a brigade under Col. E. B. Tyler. Jackson attacked the two brigades of Tyler on the morning of the 9th, and at first was repulsed, but finally, on being reinforced, after a hard fight, drove Tyler from the field and back into Conrad's Store, on the other two brigades of Shields' division. (See Port Republic, Battle of). Ewell had been recalled from Frémont's front, the bridge over the South Branch destroyed, thus checking Frémont's pursuit, and that night Jackson marched to Brown's Gap in the Blue Ridge. Frémont and Shields were ordered to cease pursuit and fall back, the former to Middletown to join Sigel and Banks, who had advanced from Harper's Ferry and Williamsport, the latter to join his corps at Fredericksburg. The Valley campaign of 1862 established Jackson's fame as a soldier. From the date of his arrival at Staunton, 5 May, to the battle of Port Republic was 35 days, during which he had marched about 300 miles, fighting four battles and engaging in many other encounters, and with 16,000 men had kept 60,000 Union troops employed, and paralyzed McClellan's campaign against Richmond. On 17 June Jackson stole quietly away from Brown's Gap to join Lee on the Chickahominy. Munford's cavalry brigade and a few infantry were left in the valley to demonstrate in the direction of Strasburg, and Munford was soon relieved by Robertson's brigade, which took post at Harrisonburg and New Market. When General Pope, 27 June, took command of the Army of Virginia, formed by the corps of Frémont, Banks and McDowell, he withdrew Frémont and Banks from the valley to the east of the Blue Ridge, leaving garrisons of a small brigade each at Winchester, Martinsburg and Harper's Ferry

to cover the Baltimore and Ohio Railroad. Throughout July and August 1862 the valley enjoyed comparative quiet. In August Lee advanced upon Pope and drove him back to the defenses of Washington, then crossed the Potomac into Maryland by a route east of the Blue Ridge. Upon arriving at Frederick and finding, contrary to his expectations, that Martinsburg, Winchester and Harper's Ferry were still held by Union troops, interposing on his proposed line of supply through the Shenandoah Valley and interfering with his intended movement into Pennsylvania, Lee on 10 September sent Jackson across the Potomac at Williamsport to clear the valley of Union troops and capture those at Harper's Ferry. Winchester had already been abandoned; General White was driven from Martinsburg to Harper's Ferry on the 11th, and on the morning of the 15th Harper's Ferry surrendered and the entire valley was once more in Confederate possession. When Lee withdrew across the Potomac, after the battle of Antietam, he halted a month on the Opequon and near Winchester; but when McClellan began crossing the Potomac at Berlin, on 25 October, and moved along the east foot of the Blue Ridge, Lee set his troops in motion up the valley, contesting with McClellan possession of the passes leading into the valley, and marching Longstreet's corps through Chester Gap to Culpeper Court House, left Jackson's corps in the valley, near Winchester, with one division at Chester Gap. McClellan was relieved from command of the Army of the Potomac 7 November, and Burnside, who succeeded him, marched from Fredericksburg, and when his advance appeared before that place on the 17th, Jackson withdrew from the valley by way of Swift Run Gap, and joined Lee at Fredericksburg, leaving in the valley a strong brigade of cavalry, supported by a small force of infantry. Union forces now crossed the Potomac and the Confederates were pushed up the valley to New Market, and again the Union troops occupied the lower valley, holding Winchester, Martinsburg and Romney, with outposts at Strasburg, and scouting up the valley of the South branch as far as Monterey. Under cover of this occupation the Baltimore and Ohio Railroad was repaired.

1863.—Active operations in the valley began this year by a Confederate raid from near Staunton to destroy the Baltimore and Ohio Railroad west of New Creek, which resulted in several encounters, and was partially successful, many bridges being burned and the road broken in places as far westward as Clarksburg, W. Va. While these movements were in progress Lee defeated Hooker at Chancellorsville, after which he immediately began preparations for his second invasion of Maryland which culminated in the battle of Gettysburg, and chose the route through the Shenandoah Valley, which offered a safe line of operations, and was held by Union troops not sufficient in number to present a serious obstacle. General Milroy, with about 9,000 men, occupied Winchester, with a brigade in observation at Berryville; General Kelley, with 10,000 men, was at Harper's Ferry; and a detachment of 1,200 men and a battery under Colonel B. F. Smith, at Martinsburg. There were outposts at Romney and also toward Strasburg and Front Royal watching the Confederate cavalry and infantry under General Jenkins in the upper valley. Lee began his movement 7 June by ordering General Imboden, then near Monterey, to move on Romney, by way of the South branch of the Potomac, and directing Jenkins, with his brigade of cavalry, to march down the valley and concentrate at Strasburg or Front Royal, to co-operate with the advance of the army. Ewell's corps, leaving Brandy Station on 10 June, passed through Chester Gap and, marching by way of Front Royal arrived at Cedarville on the evening of the 12th, where Ewell detached Jenkins' cavalry brigade and Rhodes' division of infantry to capture MacReynolds' brigade at Berryville; but MacReynolds, discovering their approach, withdrew to Winchester, which he reached by a roundabout way, on the 13th. Rhodes and Jenkins, avoiding Winchester, pushed on to Martinsburg and, on the 14th, drove Smith and his battery from the place, capturing five guns of the battery that were retiring on the Williamsport road. Smith and his infantry escaped by crossing the Potomac at Shepherdstown Ford and moving to Maryland Heights. Meanwhile Ewell, with the two divisions of Early and Edward Johnson, marched direct on Winchester, surrounded and captured most of Milroy's command on the 15th; after a hard fight, part of those who escaped reached Harper's Ferry and part crossed the Potomac at Hancock. (See WINCHESTER, MILITARY OPERATIONS AT AND NEAR). On the 15th Early crossed the Potomac at Williamsport and Shepherdstown Ford, and occupied Hagerstown and Sharpsburg. On the 17th the garrison at Harper's Ferry was withdrawn to Maryland Heights. Imboden had driven the Union troops from Romney and collected a large herd of cattle, and once more the Valley of the Shenandoah was cleared of Union troops. Lee reported that as the result of these operations Ewell had captured 4,000 prisoners, with their arms, 28 guns, 11 colors, 300 loaded wagons, with their teams and a considerable quantity of stores of all descriptions. After Gettysburg, Lee recrossed the Potomac at Williamsport on the night of 13 July and marched to Winchester and Bunker Hill. When Meade crossed the Potomac south of Harper's Ferry, Longstreet's corps moved up the valley, crossed the Blue Ridge at Chester Gap and marched to Culpeper Court House, where it arrived on the 24th. A. P. Hill's corps followed by the same route, and Ewell's after pursuing Kelley's Union troops west of Martinsburg, found Chester Gap and Manassas Gap held by Meade, who was marching along the east side of the Blue Ridge, and crossing higher up, at Thornton's Gap, joined the army at Culpeper. (See MANASSAS GAP, ENGAGEMENT AT). Again the lower valley was reoccupied by Union troops, and remained in their possession at the opening of the campaign of 1864. Late in the year General Early was put in command of two infantry brigades and some cavalry to hold the upper valley, annoy the Union forces at Winchester, to collect and bring away everything useful to the Union troops or his own, and especially to buy or seize cattle, horses, sheep and hogs, in which the lower valley and that of the South branch abounded. His instructions to do this were carried out to the letter, and the winter of 1863–64 witnessed a most remarkable for-

aging campaign, in which the lower valley and that of the South branch were stripped of thousands of animals. These foraging parties brought on many collisions between the opposing troops.

1864.— In the general movement planned by Grant for the armies under his command in May 1864, General Sigel, who had command in the Shenandoah Valley, was to advance from Harper's Ferry and Winchester up the valley, seize the rich stores of grain, and form a junction with General Crook, who, with cavalry, infantry and artillery was to march from the mouth of Gauley River, West Virginia, to destroy the Virginia and Tennessee Railroad and reinforce Sigel at Staunton, for a movement on Lynchburg. Sigel had about 24,000 men in his command, most of them guarding the railroad from the Monocacy and Harper's Ferry to Parkersburg and Wheeling. He concentrated part of them at Winchester, ordered his cavalry to Cedar Creek and Strasburg and, starting from Winchester 9 May, with 5,500 infantry and artillery, 1,000 cavalry and 28 guns, moved up the Valley. His cavalry had several mishaps and was badly punished and, after a severe defeat of his command by General Breckinridge at New Market, 15 May, he retreated to Cedar Creek. General Hunter relieved him on the 21st and, being reinforced to 8,500 men, advanced upon Gen. W. E. Jones at Piedmont, defeated him there 5 June, and next day occupied Staunton. (See PIEDMONT, BATTLE OF). At Staunton, Hunter was joined by Crook and Averell; he began the work of destruction, thoroughly and quickly completed it, and on the 7th marched on Lynchburg, which he failed to take. He was driven westward by Early, who, with his corps of 8,000 men, had been sent by Lee, 12 June, from Gaines' Mill to expel Hunter from the valley and, if possible, destroy him, and then to threaten Washington. It may here be stated that Hunter, Crook and Averell marched to the Kanawha, and thus left the valley open to Early. On 23 June Early began his return march from the pursuit of Hunter, and reached Staunton on the 27th. He had been joined by Breckinridge's division of infantry, and McCausland's brigade of cavalry. On the 29th he sent the greater part of his cavalry to destroy the bridges of the Baltimore and Ohio Railroad, and with his main body pushed down the valley turnpike, reaching Winchester 2 July. After driving all the Union troops from the lower valley and destroying as much as possible of the railroad and canal, he crossed the Potomac at Shepherdstown, demonstrated on Maryland Heights (q.v.), and marching through Frederick, defeated Gen. Lew Wallace at Monocacy (q.v.) 9 July, and then marched on Washington. Failing to take Washington by surprise, as he had hoped to do, he retraced his steps, recrossed the Potomac at White's Ford on the 14th, and resting two days near Leesburg, moved on the morning of the 16th for the Shenandoah Valley by way of Snicker's Gap in the Blue Ridge; crossed the Shenandoah River at Snicker's Ferry, and on the 17th took up a position near Berryville. Meanwhile Hunter and Crook, who had retreated from Lynchburg to the Kanawha, had come by steamboat and railroad and joined the forces at Harper's Ferry, and on the 18th and 19th engaged Early at Snicker's Ferry and Berry's Ferry without success. During the 19th Early learnt that Averell's division of cavalry, which also had come from the west, was marching from Martinsburg toward Winchester, threatening his rear, whereupon, during the night, he began a retreat to Strasburg. Averell defeated Ramseur's division at Stephenson's Depot on the 20th, which caused Early to move back with one division from Newtown to Winchester; but being threatened by the Union advance from Berryville, he again fell back to Newtown, and on the 21st concentrated his infantry near Middletown. Next day he fell back beyond Cedar Creek and covered all the roads from Winchester. Crook and Averell united their forces at Kernstown, and on the morning of the 24th Early again moved on Winchester, attacked Crook and drove him back, pursuing beyond Winchester. (See KERNSTOWN, SECOND BATTLE OF). Early continued the pursuit next day to Bunker Hill, Crook and Averell recrossing the Potomac. On the 26th Early marched to Martinsburg (q.v.), and devoted the 27th and 28th to the destruction of the railroad; and on the 29th McCausland crossed the Potomac on his noted raid to Chambersburg, Pa. (q.v.). Early remained at Martinsburg and Bunker Hill until 3 August, sending expeditions into Maryland by Williamsport and Shepherdstown fords to Hagerstown and Sharpsburg, collecting horses, cattle and other supplies, then, recrossing the Potomac on the 6th, concentrated at Bunker Hill on the 7th.

Grant had been annoyed and disturbed by these Confederate irruptions and operations in the valley, and had come to the decision that it should be made untenable for either army and had framed instructions for Hunter to drive the Confederates from it and make it a waste, where no army could live. Hunter yielded the command to Sheridan, who took it 7 August and proceeded to carry out Grant's instructions. On the morning of the 10th Sheridan marched his army from Halltown, near Harper's Ferry, toward Early's line of communication, upon which Early abandoned Winchester on the 11th and fell back to Cedar Creek, followed by Sheridan next day. At Cedar Creek Early received reinforcements — a division of infantry, two brigades of cavalry, and a battalion of artillery from Lee's army, all under command of Gen. R. H. Anderson — and resumed the offensive so aggressively with his cavalry, bringing on several sharp encounters, that Sheridan withdrew his infantry on the night of the 16th, his cavalry following next day, driving all the livestock in that part of the valley before it, and burning the grain from Cedar Creek to Berryville, near which Sheridan had taken position. Early pursued Sheridan on the morning of the 17th, struck and routed part of his command near Winchester, drove it through the town, and on the 21st moved with his whole army to attack Sheridan at Berryville. That night Sheridan, after some sharp encounters with Early's advance, fell back to Halltown. For three days Early demonstrated on Sheridan's position, then, leaving one division in front of Sheridan, marched on the 25th, with four divisions and his cavalry, to Lee Town and toward Sheperdstown, his cavalry pushing on to Williamsport. Beyond Lee Town, Early met and engaged Torbert's cavalry

and drove it back to Sheperdstown. (See SHEPHERDSTOWN, ENGAGEMENTS AT). Early remained that night at Shepherdstown, where he was joined next day by his cavalry, which had demonstrated on Williamsport, and the command returned to Winchester. On August 28 Sheridan advanced his infantry to Charlestown. Merritt's cavalry division, going by way of Lee Town, drove the Confederate cavalry from that place to Smithfield and across the Opequon. Next day Early drove Merritt back through Smithfield, but was checked and driven back himself across the Opequon by a division of Sheridan's infantry. (See SMITHFIELD, ENGAGEMENT AT AND NEAR). There were now several minor encounters and counter demonstrations, and on the morning of September 19 Sheridan crossed the Opequon and in a hard-fought battle defeated Early, who retreated to Newtown and Fisher's Hill, near Strasburg. (See OPEQUON, BATTLE OF THE). Sheridan followed on the 20th, and on the 21st again defeated Early at Fisher's Hill (q.v.), pursuing his retreating troops during the night and next day to Mount Jackson. Beyond New Market, Early abandoned the valley pike and took a road leading to Port Republic. Sheridan, not having his cavalry with him, halted until it came up on the 25th, when it advanced to Staunton and Waynesborough, destroying the railroad between the two places, but, being threatened in flank and rear by Early, fell back, burning mills, storehouses, barns, grain and forage, driving before them all livestock and devastating the whole width of the valley from Staunton northward. On the return march Sheridan's cavalry was harassed by that of the Confederates, who were turned upon and routed at Tom's Brook, October 9, when Sheridan resumed his march down the valley, halting on the 10th on the north side of Cedar Creek. Early had followed, and on the morning of October 19 fell upon Sheridan's army and drove it back in some disorder, but it was rallied near Middletown and, resuming the offensive, defeated Early, who retreated to New Market. (See CEDAR CREEK, BATTLE OF). This practically ended the valley campaign of 1864. There were numerous raids and cavalry encounters, but no general movements or heavy engagements. Early remained in the vicinity of New Market until December 16, when he fell back to near Staunton, and Sheridan went into winter quarters at Kernstown. Between the two there was no subsistence for man or beast; the valley had been desolated. One of Early's staff records in his diary that from the time of Early's appearance in the valley late in June till the middle of November he had marched 1,670 miles and had 75 battles and skirmishes.

1865.—During the winter the greater part of Early's command was sent to Lee at Petersburg, leaving Early a very small force of infantry and cavalry. On February 27, Sheridan, with two well-equipped divisions of cavalry of 5,000 men each, started from Winchester on the last campaign up the Shenandoah Valley, and with but little opposition reached Staunton, Early falling back to Waynesborough. The work of destruction at Staunton was completed, and Early was followed to Waynesborough, where on March 2 his command of 1,800 men was defeated and dispersed, most of them being captured, with all their colors, 11 guns and train. (See WAYNESBORO, BATTLE OF). Sheridan then moved unmolested to the Virginia Central Railroad, which he destroyed for miles, and marched to White House, on the Pamunkey River, where he arrived March 19, and then moved to join Grant's army before Petersburg.

There is no area upon which the armies contended that witnessed more brilliant strategy, fertility of resource, more rapid and exhausting marches, and more gallant fighting than that enclosed by the Alleghany Mountains and the Blue Ridge. Consult Hotchkiss, J. and Allan, W., *The Battlefields of Virginia* (New York 1867); Pond, G. E., *The Shenandoah Valley in 1864* (New York 1883); Buffum, F. H., *Sheridan's Veterans* (Boston 1883–86); Kellogg, S. C., *The Shenandoah Valley and Virginia, 1861–65* (New York 1903); Ashby, T. A., *The Valley Campaigns* (New York 1914); and The Century Company's *Battles and Leaders of the Civil War.*

SHENSHIN, Afanasi Afanasievich. See FET, AFANASI AFANASIEVICH.

SHENSI, cradle of Chinese civilization, is the most easterly province of China's Northwest, with an area of about 73,000 square miles. Its territory is part of the great area, roughly oblong, formed by the northward bend of the Yellow River, which marks Shensi's eastern border until the river turns east. It is traversed by the Peiling range which separates the basins of the Yellow and Yangtze rivers. The province is watered mainly by the Wei and other Yellow River tributaries, and in the south by the Han, part of the Yangtze system. But Shensi agriculture depends on irrigation, and the province is known for its canals, ancient and modern. It is one of the important food-producing provinces of the Northwest. Its chief crops are: wheat, barley, kaoliang, rice, and cotton. It also produces a large quantity of wool. Shensi's oil resources include about two thirds of China's oil reserves, and its coal reserves are next to the largest in China. Other minerals include gold, iron, and salt. Sian, the capital, is the most important city. Yenan, a small town in the north, capital for more than a decade of the Communist northwest border region, was captured by national government forces in the spring of 1947. Pop. (official est. 1945–1946) 9,649,168.

SHENSTONE, William, English poet and landscape-gardener: b. Halesowen, Worcestershire, Nov. 13, 1714; d. there, Feb. 11, 1763. He was educated at Oxford, and intended entering a profession, but on inheriting his father's estate, Leasowes, lived in retirement upon it, devoting his life to beautifying it and to writing poetry, including *The Schoolmistress* (1742), *Pastoral Ballad* (1743), and the stanzas *Written in an Inn.* His complete works were published by Robert Dodsley, 3 vols. (1764–69); 20th century editions include the songs (Chelsea, England, 1930), essays (*Men and Manners,* edited by Havelock Ellis, Waltham Saint Lawrence 1927), and letters (edited by Marjorie Williams, Oxford 1939); and a biography by A. R. Humphreys appeared in 1937 (Cambridge, England). Walpole called him "that water-gruel bard" who, laboring a lifetime, never wrote a perfect song.

SHEOL, shē'ōl, a Hebrew word signifying the place of the dead. Wherever it occurs in

the Hebrew text it is rendered in the authorized English version by «grave» or by «hell,» or by «pit.» In the revised version «Sheol» is generally left untranslated in the text, while «grave» is put in the margin. (See HADES; HELL). Consult Jastrow, M. (in *American Journal of Semitic Languages,* Vol. XIV, Chicago 1898); Jensen 'Die Kosmologie der Babylonier' (Strassburg 1890); Schroder, 'Die Keilinschriften und der alte Testament' (Berlin 1902).

SHEPARD, Charles Upham, American mineralogist: b. Little Compton, R. I., 29 June 1804; d. Charleston, S. C., 1 May 1886. He was graduated from Amherst in 1824 and made a special study of botany and mineralogy in the following year. He was lecturer on natural history at Yale in 1830–47, occupied the chair of chemistry at the Medical College of South Carolina in 1854–61 and resumed it a few years after the Civil War. He was professor of chemistry and natural history at Amherst in 1845–52, and from 1852–77 was lecturer on natural history, after which he was made professor emeritus. His investigations resulted in the discovery of a new species of microlite in in 1835, of warwickite in 1838, and of danburite in 1839, and he was also the discoverer of valuable deposits of phosphate of lime near Charleston which have proved of great value to agriculture, and their use in the manufacture of superphosphate fertilizers has made an important addition to the chemical industries of South Carolina. His collection of minerals was at one time the best in the country, but was unfortunately partially destroyed by fire three years after its purchase by Amherst in 1877. In addition to his numerous scientific papers his publications include 'Report on the Geological Survey of Connecticut' (1837); 'Treatise on Mineralogy' (1855), etc.

SHEPARD, Edward Morse, American lawyer: b. New York, 1850; d. 28 July 1911. He was graduated from the College of the City of New York in 1869, studied law and was admitted to the bar. He established a practice in Brooklyn, and was an active member of the Democratic party there, being one of the organizers of the Young Men's Democratic Club of Brooklyn. He held no public office except as member of the civil service commission of the city in 1883–85, and chairman of that commission in 1888–90. In 1884–85 he was a State forestry commissioner, and was the author of the commission's report for that year. In 1901 he was the regular Democratic nominee for mayor of Greater New York, but was defeated by Seth Low. For several years he was counsel for the New York Rapid Transit Commission, and resigned that position in March 1904 to become general counsel for the Pennsylvania Railroad. He wrote 'Martin Van Buren' (in American Statesmen Series; rev. ed., 1900); 'Dishonor in American Public Life' (1882); 'The Work of a Social Teacher' (1884).

SHEPARD, Helen Miller (GOULD), American philanthropist: b. New York, 20 June 1868; d. 21 Dec. 1938. She was a daughter of the late Jay Gould (q.v.), and achieved fame through her benefactions for charitable and other uses. At the opening of the war with Spain she not only contributed $100,000 to the United States government, but was active in the Woman's National War Relief Association, to which she was a generous contributor. Among other notable gifts of hers are the library of New York University; $50,000 to the naval branch of the Young Men's Christian Association of Brooklyn; and $100,000 to New York University, for a Hall of Fame for Great Americans, in 1900. She married Finley Johnson Shepard 22 Jan. 1913; was a member of the board of the Russell Sage Foundation and of the national board Y. W. C. A.

SHEPARD, Thomas, English Puritan divine: b. Towcester Northamptonshire, 5 Nov. 1604; d. Boston, Mass., 25 Aug. 1649. He was graduated at Emmanuel College, Cambridge, in 1623, and after taking his A.M. there in 1627 he became a preacher at Earles-Colne. His practices, however, displeased Bishop Laud and he was forbidden to preach within the diocese of London. He was later chaplain to Sir Richard Darly in Yorkshire, and afterward was called to the ministry at Heddon Northumberland. Through his non-conformity he was again silenced, this time by Archbishop Neile. He went to Boston in 1635, and was ordained pastor at Newton, now Cambridge. He was active in founding Harvard College and secured its location at Cambridge. He was also instrumental in establishing an Indian Mission. His religious writings attained a considerable reputation. Author of 'The Sincere Convert' (1641); 'The Sound Believer' (1645); 'Theses Sabbaticæ' (1649), etc.

SHEPARD, William, American soldier: b. Boston, Mass., 1 Dec. 1737; d. Westfield, Mass., 11 Nov. 1817. He enlisted in the provincial army at the outbreak of the French and Indian War and served until 1763, participating in the battles of Fort William Henry and Crown Point and attaining rank as captain. He entered the Continental service at the beginning of the American Revolution, became colonel in 1777 and served until the close of the war. He was engaged in 22 battles and won a high reputation for his courage and ability. In 1788–90 he was a member of the executive council and as brigadier-general in command of the militia he defended the arsenal in Springfield at the time of Shays' Rebellion in 1786. He was afterward promoted major-general of militia and in 1797–1803 served as member of Congress.

SHEPHARD, Elliot Fitch, American lawyer and journalist: b. Jamestown, N. Y., 25 July 1833; d. New York, 24 March 1893. He was graduated at the University of the City of New York in 1855 and was admitted to the Bar in 1858, afterward engaging in practice in New York. At the outbreak of the Civil War he was appointed aide-de-camp to Governor Morgan, with rank of colonel, and was assigned to recruiting service. He raised the 51st New York Volunteers, known as Shephard's Rifles, and was instrumental in enlisting a total of about 50,000 men. He founded the New York Bar Association in 1876 and remained in practice in New York until 1884. He bought the *Mail and Express,* New York, in 1888, thereafter editing it. He bitterly opposed Sunday traffic and travel and as owner of the Fifth Avenue stage line retused to permit its operation on Sunday.

SHEPHEARDES CALENDER, The. *The Shepheardes Calender* was published anonymously in 1579, with a dedication "To the noble and vertuous gentleman most worthy of all titles both of learning and chevalrie, M. Philip Sidney." The book consists of 12 eclogues, each eclogue accompanied by a commentary or glossary that gives the argument and the meaning of unusual words; and purports to be written by E. K., a friend of the poet's identified by some scholars with Edmund Kirke, a college mate of Spenser's, and by others with Spenser himself. The whole is introduced by a "General Argument" and an epistle to Master Gabriel Harvey of Cambridge. The *Calender* was an immediate success. It went through five editions during Spenser's lifetime, the first in 1579, and then in 1581, 1586, 1591, 1597; and was regarded as one of the high-water marks of English poetry. *The Shepheardes Calender* is descended from many sources. From the eclogue end its origins were in Theocritus most of all, and to varying degrees in Bion, Virgil, Petrarch, and Boccaccio, Spagnuoli, Sannazaro, and Marot. In meters and rhythms, of which Spenser attempts a wide variety, his main sources are Chaucer in particular, Surrey, Marot, and the old ballads. The language of the book marks Spenser as a daring innovator in poetic diction. It consists of words and forms from Lancashire and other dialects, of colloquialisms, old literary words, obsolete expressions, the best of contemporary poetic diction, and coinages in words and in forms, often happy, sometimes far-fetched, of Spenser's own.

The single eclogues employ the traditional devices: the monologues, the two- and three-part dialogues, the singing contests and the stories. The scheme of an eclogue to the month; following the general plan of country almanacs was original. But this motive is followed only indifferently; in October not at all, quite fully in the January, February, November and December divisions. In like manner the romance of Colin's love for Rosalynd also runs through some of the eclogues and is absent from others. The two motives combine to make the framework of the poem.

There is probably no one book in English that looks in so many poetic directions as *The Shepheardes Calender*. It is the work of a young writer possessed of enthusiasm, the splendor and excitement of the Renaissance, wide taste and reading, and one of the supreme lyrical gifts in all poetry for tone, rhythm, ornament and the enveloping glamor of a beautiful and rare spirit and mentality. Most of Spenser's later work finds its beginnings in the *Calender;* and though he progressed far beyond it in every way, in profundity of content, in rhythm and imagery, the progression was in almost every case directly from the qualities of his first work. As the poet's poet, which he undoubtedly is, Spenser stands from the first revealed. In *The Shepheardes Calender* lovers of Milton will find many of his qualities predicted, and to a varying extent the same is true of Shakespeare, Keats, Chatterton, Blake, Coleridge, Wordsworth and Tennyson, to mention only a few of Spenser's debtors.

STARK YOUNG.

SHEPHERD, Francis John, Canadian physician: b. Cavagnol, Quebec, Nov. 25, 1851; d. Jan. 18, 1929. He was graduated M.D. at McGill University in 1873 and later studied in England, France, Germany and Austria. He was associated with the medical faculty at McGill from 1875 and from 1883–1914 was professor of anatomy there, acting as dean of the medical faculty in 1908–14. He was consulting surgeon to the Montreal General and Royal Victoria hospitals. He was joint author of *American Text-Book of Surgery* (1892); *Retrospect of Surgery* 3 vols., (1881–94) and editor of *Robert Craik's Addresses* (1907).

SHEPHERD, William Robert, American historian and educator: b. Charleston, S. C., June 12, 1871; d. June 7, 1934. He was graduated at Columbia University in 1893 and later studied at the universities of Berlin and Madrid. He was a member of the faculty at Columbia from 1902 and from 1912 was professor of history there. He specialized in United States colonial history and in that of Latin America. He was honorary professor of the University of Chile. Author of *History of Proprietary Government in Pennsylvania* (1896); *Battle of Harlem Heights* (1898); *The Cession of Louisiana to Spain* (1904); *Passing of New Amsterdam* (1912); *Central and South America* (1914); *Latin America* (1914); *Expansion of Europe* (1915); *Common sense in Foreign Policy* (1917); and *Hispanic Nations of the New World* (1919). His *Historical Atlas* (1911) is the book by which generations of undergraduates have known him.

SHEPHERD'S PURSE, a small cruciferous weed (*Capsella bursa-pastoris*). It has rosettes of lobed or pinnatifid leaves, a short stem, branching into spreading pedicels carrying racemes of small white flowers, rapidly succeeded by triangularly heart-shaped capsules, which have suggested this name and also those of mother's heart, caseweed, shepherd's bag, etc., by their resemblance to ancient wallets. Originally European, this plant has been naturalized throughout the temperate regions, blooming during the entire year.

SHEPHERDSTOWN, town, West Virgina, in Jefferson County; altitude 402 feet; on the Potomac River; 16 miles southwest of Hagerstown, Md., and 74 miles west of Washington, D.C.; on the Norfolk and Western Railroad. Dairy farming and fruit growing, and the packing and storage of apples are its industries. It is the seat of Shepherd College, a state institution with an enrollment of about 450. Settled in 1732 and incorporated in 1762, this is the oldest town in West Virginia. The first house built in the state is here. The original settlers, Germans from Pennsylvania, called the place Mecklenburg; the name was changed upon incorporation, in honor of Thomas Shepherd, the founder. Here, in 1787, the inventor James Rumsey (q.v.) gave a public showing of his steamboat; his log cabin was preserved, and a monument erected in his honor. The town has had mayor and council government since 1794. Pop. (1950) 1,173.

SHEPHERDSTOWN, Engagements at and Near. Situated in a great bend of the Potomac, nine miles east of Martinsburg and on one of the principal routes from the Shenandoah Valley to Maryland, Shepherdstown, W. Va., was the scene of much activity during

the Civil War. Both armies, at various times, crossed the Potomac at a ford about one mile below the town, which was used by the Confederates when they withdrew from the Antietam battlefield, 18–19 Sept. 1862, and by a great part of Lee's infantry when they marched to Gettysburg in June 1863. On 25 Sept. 1862 General Pleasonton's cavalry division crossed the ford on a reconnaissance toward Martinsburg and a few miles beyond Shepherdstown encountered the Confederates in some force, and was checked after capturing a few men. Again (1 Oct. 1862) Pleasonton crossed the river, with 500 cavalry and a battery of six guns, drove the Ninth Virginia cavalry from Shepherdstown and pursued it across the Opequon and into Martinsburg, where he encountered the rest of Col. W. H. F. Lee's brigade and a battery, both of which were driven from the place. Pleasonton remained in the town until 5 P.M., when he started on his return march, followed by Confederate cavalry and two guns, with whom about dark he had an encounter when within a mile of Shepherdstown, after which he recrossed the Potomac. The loss was slight on both sides. On 16 Oct. 1862 in co-operation with General Hancock's division, which advanced from Harper's Ferry toward Charlestown and Winchester, General Humphreys, with about 500 cavalry, 6,000 infantry and six guns, marched from Sharpsburg, crossed Shepherdstown Ford at 4 A.M., and moved toward Smithfield on a reconnaissance. A mile out of Shepherdstown his advance was contested by Fitzhugh Lee's cavalry brigade and two guns. Lee was driven beyond Kearneysville, where he was reinforced by cavalry and a brigade of infantry, but was driven back, and Humphreys went into bivouac. The latter resumed his march on the morning of the 17th, and one and a half miles beyond Kearneysville came upon Lee in a strong position. Not desiring to bring on an engagement, and having his cavalry make a dash on Smithfield, which was found occupied by Confederate cavalry, Humphreys returned to Sharpsburg by the way he had gone out, followed by cavalry and artillery as far as Shepherdstown.

After his Gettysburg campaign, Lee recrossed the Potomac at Williamsport 14 July 1863. On that day, to watch his movements, General Gregg's cavalry division was sent across the Potomac at Harper's Ferry, and on the 15th marched to Shepherdstown, driving some cavalry from the town that evening and encamping nearby. On the 16th, about 1 P.M., Gregg's advance near Kearneysville was attacked by Fitzhugh Lee, with his own and Chambliss' brigade, supported by Jenkins' brigade. Gregg was gradually driven back upon his guns, when he rallied his command, and the sharp engagement was continued, lasting until dark, both sides dismounted. This engagement was on the Boteler farm, about a mile from town. During the early morning Gregg fell back to Harper's Ferry, with a loss of 70 killed, wounded and missing as the result of his fight on the 16th. The Confederate loss was 106.

On 21 Aug. 1864 Sheridan fell back from the line of the Opequon to Halltown, near Harper's Ferry, the cavalry, under General Torbert, being moved to his right at and near Shepherdstown. General Early demonstrated on the position at Halltown for three days, and on the 25th with the four infantry divisions of Rodes, Ramseur, Gordon and Wharton, with their artillery, moved northward toward Shepherdstown, his cavalry at the same time moving on Williamsport to keep up the impression of an invasion of Maryland and Pennsylvania. Between Lee Town, seven miles southwest of Shepherdstown and Kearneysville, Early came upon Merritt's and Wilson's cavalry divisions, under Torbert, who had marched from Shepherdstown and Duffield's that morning on a reconnaissance to Lee Town. Torbert promptly attacked Wharton's division, Early advanced and drove it back in confusion nearly a mile. Early brought up the rest of his command, and after a short and sharp contest in which artillery was freely used, Torbert ordered his two divisions to fall back, Wilson's by the route it had come, and Merritt's by the direct road to Shepherdstown. Merritt was followed so closely by Early that when near Shepherdstown on the Charlestown road, Custer's brigade was ordered out to repel the advance, in which it succeeded, driving it back; but it was in turn struck in flank and rear by Gordon's division, which had marched across the country. Devin's brigade was sent to Custer's relief, and engaged Gordon. Custer was cut off and, after a sharp fight, made his escape by crossing the Shepherdstown Ford into Maryland. It was now dark; Merritt rejoined Wilson and both joined Sheridan. The loss was considerable on both sides. Early encamped near Shepherdstown, and next day moved back across the Opequon, and on the 27th to Bunker Hill. (See CIVIL WAR IN AMERICA). Consult Dandridge, Mrs. D., 'Historic Shepherdstown' (Charlottesville, Va., 1910).

E. A. CARMAN.

SHEPHERDSTOWN (Boteler's) **FORD Engagement at.** General Lee withdrew from the field of Antietam during the night of 18 Sept. 1862 and recrossed the Potomac into Virginia by the Shepherdstown or Boteler's Ford, one mile below Shepherdstown and about two and one-half miles from Sharpsburg. Leaving some artillery and two small infantry brigades at the ford to hold McClellan in check, he marched his army for the Opequon. On the morning of the 19th Pleasonton's cavalry followed Lee to the Potomac, and in the evening detachments of the Fifth corps forded the river, drove away the Confederate infantry, and seized some of the artillery. To ascertain how far Lee had retreated, General Porter was authorized by McClellan to send a reconnaissance beyond the Potomac on the morning of the 20th, and Porter ordered over the divisions of Generals Morell and Sykes. Before daylight two regiments crossed with spare horses, secured three guns that had been taken the night before, and took them to the Maryland side. At 8 o'clock Sykes crossed the river with Lovell's brigade of regulars and pushed out a mile on the Charlestown road, when he discovered the Confederates in force, upon which Lovell fell back, skirmishing, to the heights near the river, and Warren's small brigade of two regiments formed on his left. The Confederates encountered were Gen. A. P. Hill's division of six brigades, supported by three brigades under

General Early, all sent back by Lee when he heard that the Union advance had crossed the river. Hill's skirmishes had slowly pressed back Lovell, and meanwhile Barnes' brigade of Morell's division had crossed the river, under orders to go on the road to Shepherdstown; but Sykes ordered it straight to the top of a high steep bluff on the river bank to connect with Lovell's right. Before Barnes' brigade had all taken position Sykes came to the conclusion that he was too largely outnumbered to remain on that side of the river, and ordered the troops to recross, which was done by the left in good order, under cover of a heavy artillery fire from the Union batteries on the Maryland side; but the withdrawal on the right was not accomplished without disaster. The 118th Pennsylvania or "Corn-Exchange" regiment, 737 officers and men, had ascended the high bluff, and was not fairly in position when it was attacked by five brigades of A. P. Hill's division. It made a good fight, but was attacked on both flanks and in front, Colonel Prevost was wounded, and the regiment was driven in disorder over the precipitous rocky bluff, many being killed and wounded in falling to the roadway below. The men began to cross the river, and the Confederates, advancing to the bluff, fired upon them as they were struggling to regain the opposite shore. Some were killed in the water; some were drowned; others, who took refuge in old lime kilns on the bank of the river, were killed or wounded by careless firing of the Union batteries; and some surrendered. In this disastrous affair the regiment lost 53 killed, 10 wounded and 105 missing, or 269 out of a total brigade loss of 317. A. P. Hill's loss was 30 killed and 231 wounded. The Union loss on the 19th and 20th was 71 killed, 161 wounded and 131 missing; the Confederate loss, 33 killed and 252 wounded. After the engagement of the 20th A. P. Hill and Early marched from the field and joined the main body of the army, which bivouacked that night on the Opequon near Martinsburg.

SHEPPARD, Edmund Ernest, Canadian journalist: b. South Dorchester, Ontario, Sept. 29, 1855; d. California, Nov. 6, 1924. After attending Bethany College, West Virginia, he spent some years as a journalist in the southern United States. Following his return to Canada he became editor of the Saint Thomas *Journal,* 1881–1883, and editor in chief of the Toronto *News,* 1883–1887. In 1887 he founded the Toronto *Saturday Night,* and he served as its editor until 1906; during 1895–1897 he was also owner and editor in chief of the Toronto *Star.* He represented the Dominion government on a commercial mission to Latin America in 1897. Besides his journalistic work, he wrote several novels, among them *Dolly* and *The Widower Jones.*

SHEPPARD, John (known as JACK), English criminal: b. Stepney, near London, December 1702; d. London, Nov. 16, 1724. Brought up in the workhouse at Bishopsgate, he ran away from the carpenter to whom he had been apprenticed and, incited by Bess Lyon ("Edgeworth Bess"), took to a life of thieving and robbery. Several times imprisoned, on each occasion he made his escape with characteristic audacity. He was at the summit of his career when he fell into the custody of Jonathan Wild, a broker of stolen goods, who gave him up to justice on July 23, 1724. Tried at the Old Bailey and condemned to death, before his execution was effected he escaped twice from prison. He was hanged at Tyburn in the presence of 200,000 people, his body being buried in the churchyard of St. Martin's-in-the-Fields. His career furnished the theme for several plays and books, notably the *Jack Sheppard* (1839) of Harrison Ainsworth (q.v.). Sir James Thornhill (q.v.) painted his portrait in Newgate prison.

SHEPPARD, Morris, United States Senator: b. Wheatville, Texas, May 28, 1875; d. Washington, D.C., April 9, 1941. He took law degrees at the University of Texas, 1897, and Yale, 1898, and practiced law from 1899 at Texarkana, Tex. For almost 39 years he served continuously in Congress, during 1902–1913 in the House of Representatives and thereafter in the Senate. He drafted the Senate resolution from which derived the 18th (Prohibition) Amendment, and in 1921 he was cosponsor of the Sheppard-Towner Act which provided for federal and state cooperation toward maternal and infant welfare and hygiene. As chairman of the Military Affairs Committee he was closely associated with the administration's preparedness program.

SHEPSTONE, shĕp'stŭn, SIR **Theophilus,** British South African statesman: b. near Bristol, England, Jan. 8, 1817; d. Pietermaritzburg, Natal, June 23, 1893. At the age of three he was taken by his father, a missionary, to Cape Colony, where, as he grew up, he acquired a close understanding of the native peoples. He was an interpreter with British forces in the Kaffir War of 1835 and in the occupation of Port Natal (later Durban) three years later, and was then appointed "diplomatic agent" to a number of tribes in Natal. From 1856 till 1877 he was secretary for native affairs in the colonial government of Natal, in this capacity creating reserves for native settlement and giving considerable administrative authority to the chiefs. As a result of his influence Cetewayo (q.v.) was proclaimed king of the Zulus in 1872, but the latter soon abandoned his promises to live at peace with his neighbors and by 1876 was threatening the security of the South African Republic (Transvaal). At this juncture Shepstone was sent into the Transvaal, the government of which was practically bankrupt and menaced by other tribes in addition to the Zulus, and on April 12, 1877, he issued a proclamation annexing the country.

SHERATON, shĕr'ă-t'n, **Thomas,** English furniture designer and cabinet maker: b. Stockton-on-Tees, 1751; d. London, Oct. 22, 1806. He was apprenticed to a cabinet maker, and was self-taught in drawing and geometry. About 1790 he settled in Soho Square, London, and there began the publication of the books of furniture designs which place him in the front rank of English furniture designers. There is no evidence that he had a shop of his own, and very little of his work is known to be in existence. He made a scanty living through the sale of his books, by teaching drawing, occasional preaching in Baptist chapels, and the publication of a number of religious books. He failed to

achieve much success as a practical cabinetmaker, but his early furniture designs had far-reaching influence and were widely copied. It was his theory that beauty in furniture lies in utility worked out through sound lines of construction. His later work shows an unfortunate departure from the rules laid down at the beginning of his career, for his natural inventiveness was tempted by the vogue of the French Empire style. In exploiting this, he departed from the beauty and simplicity of line of his earlier work. His books of designs are *The Cabinet-maker and Upholsterer's Drawing-book* (111 plates, 1791; 2d ed., 119 plates, 1793–96; 3d ed., 122 plates, 1802); *The Cabinet Dictionary* (1803); *The Cabinet-maker and Artist's Encyclopedia* (30 parts, 1804–06). The last work was planned in 125 parts, but only 30 were completed before his death. See also FURNITURE.—*English* (Sheraton [1790–1810]).

SHERBROOKE, shûr'brŏŏk, SIR **John Coape**, English soldier: b. England, 1764; d. Calverton, Nottinghamshire, Feb. 14, 1830. He was commissioned ensign in the army in 1780, served as captain in Nova Scotia in 1784–1785, as lieutenant colonel in the latter part of the Netherlands campaign in 1794, and in 1796–1800 in India and South Africa. Promoted major general in 1805, he was sent to Egypt to negotiate a treaty with the beys in 1807, and in 1808 was in temporary command of the British troops in Sicily. In the Peninsular War he was second in command to Arthur Wellesley (later duke of Wellington) in the campaign of 1809, and was awarded a medal for his gallant conduct at Talavera de la Reina. Promoted lieutenant general in 1811, he was appointed lieutenant governor of Nova Scotia, and in 1814 led a naval expedition to Maine, capturing various points on the Penobscot River. He became captain general in 1816 and governor general of Canada, but resigned in 1818 after a paralytic stroke and returned to England. For the remainder of his life he lived in retirement.

SHERBROOKE, VISCOUNT. See LOWE, ROBERT.

SHERBROOKE, city, Quebec Province, Canada. The county seat of Sherbrooke County, it is located at the junction of the Magog and St. Francis rivers about 80 miles east of Montreal and 30 miles north of the United States boundary, in a section of Quebec known as the Eastern Townships. It is served by the Canadian National and the Canadian Pacific railroads, and is a terminus of the Quebec Central and the Boston and Maine railroads. At Windsor Mills, 11 miles distant, is an airport. The city is the cultural and commercial center of a lumber, dairy, and cattle region which has copper and asbestos mines. The leading manufactured products are industrial machinery, rayon, cotton yarn and cloth, hosiery, and condensed milk. Abundant power is provided by municipally owned power plants. A Roman Catholic college and seminary here are affiliated with the University of Montreal. Sherbrooke was settled late in the 18th century by loyalists from Vermont and New Hampshire and colonists from the British Isles. In 1794 it was known as Hyatt's Mills. When incorporated as a town in 1857, it was named for Sir John Coape Sherbrooke, governor general of Canada (1816–1818). In 1875 it was incorporated as a city. Pop. (1951) 50,543.

SHERE ALI or **SHER ALI**, shār'ŭ'lē (also **SHERE ALI KHAN**), amir of Afghanistan: b. 1825; d. Mazar-i-Sharif, Afghan Turkistan, Feb. 21, 1879. A son of Dost Mohammed Khan, he succeeded him as amir in 1863. At first friendly to the British, he turned against them when they failed to guarantee his rule, and his hostile acts brought on the Second Afghan War (1878–1881). Defeated by the British (1878), he fled to Turkistan, where he died. He was succeeded as amir by his son, Mohammed Yakub Khan (q.v.).

SHERIDAN, shĕr'ĭ-d'n, **Philip Henry**, American soldier: b. Albany, N. Y., March 6, 1831; d. Nonquitt, Mass., Aug. 5, 1888. After graduation from the United States Military Academy at West Point (1853), he served in the 1st and 4th Infantry regiments in the West until May 1861, when he was appointed captain in the 13th Infantry. In December 1861 he was made quartermaster and commissary of the Union Army in southwestern Missouri, and was Gen. Henry W. Halleck's quartermaster during the Corinth campaign in 1862. In May 1862 he was appointed colonel of the 2d Michigan Cavalry and was made brigadier general of volunteers in July. He served with distinction in the battles of Perryville and Stone River, and was made major general of volunteers Dec. 31, 1862. In 1863 he distinguished himself in the Battle of Chickamauga and also bore an important part in the Battle of Chattanooga, where he attracted the attention of Gen. Ulysses S. Grant. When Grant took command in Virginia, he had Sheridan transferred (April 1864) to the Army of the Potomac as commander of cavalry.

Sheridan was actively engaged in the battles of the Wilderness, Spotsylvania Court House, Cold Harbor, and other actions. From May 9 to 25, 1864, his corps raided the Confederate communications around Richmond, destroying 10 miles of track on three important railroads, cutting the telegraph wires, capturing several trains, and causing much alarm in the Confederate capital. On May 28 he fought the Battle of Hawes's Shop, and on June 11 that at Trevilian Station. Nearly every day in May, June, and July Sheridan's cavalry was engaged with the Confederate troops or raiding their communications. On Aug. 7, 1864 he was placed in command of the Army of the Shenandoah with instructions to clear the valley. He defeated Gen. Jubal A. Early at Winchester and at Fisher's Hill in September, and was rewarded by being made a brigadier general in the Regular Army. After the Battle of Fisher's Hill he laid waste the Shenandoah Valley. Practically everything destructible was destroyed and the horses, cattle, and sheep were driven out. His object was to prevent future expeditions by the Confederates up the valley by destroying the means of subsistence; but because the noncombatants were reduced to the verge of starvation, Sheridan was much censured for his course. On Oct. 19, 1864 his army was surprised and routed in the Battle of Cedar Creek by Early, who neglected to pursue. Sheridan, who was 20 miles away when the battle began, made his famous ride, rallied his troops, and decisively defeated Early. On Nov. 8, 1864 Sheridan was made major general in the Regular Army. From February 27 to March 24, 1865 he raided from Winchester to Petersburg, cutting three railroads, two canals, telegraph wires, destroying supplies, and leaving only one line of railroad by which supplies could

be brought to Lee's army. During this raid he defeated Early again at Waynesborough (q.v.). At Five Forks (q.v.) 1 April Sheridan turned Lee's flank, forcing him to evacuate Petersburg and begin the retreat to Appomattox. In the pursuit of Lee, Sheridan took a leading part, and when he had placed his army squarely across the Confederate line of march at Appomattox Court House the surrender took place (9 April).

From May 1865 to March 1867 Sheridan commanded the Military Division (later Department) of the Gulf. His strong force on the Mexican border encouraged the Liberals and forced the French to withdraw their support from Maximilian. In his 'Personal Memoirs' Sheridan states that material assistance was secretly given by the United States authorities to the Liberal army under Juarez, 30,000 muskets at one time being sent to the latter from the United States arsenal at Baton Rouge. After the passage of the reconstruction acts, in March 1867, Sheridan was placed in command of the fifth Military District, consisting of Louisiana and Texas, with headquarters at New Orleans. His career as military governor was a stormy one. He was in favor of radical measures in dealing with the conquered Southerners, and in the troubles that arose in his district he was supported by General Grant and opposed by President Johnson, who sent several messengers to him in the endeavor to influence him to a more moderate course. Sheridan, believing that severe measures were necessary, refused to conform to the suggestions of the President's agents, and Johnson, after Sheridan's wholesale removal of civil officers, relieved him from command of the Fifth Military District in September 1867. General Grant strenuously protested, but Johnson was firm and Sheridan was transferred to the Department of the Missouri. In 1869, when General Grant became President, Sheridan was made lieutenant-general. In 1870–71 he was with the German armies observing the campaigns of the Franco-German war; in 1875 was again sent to New Orleans on account of the political riots in that city; in 1878 commanded the Western and Southwestern Military Divisions; in 1883 succeeded Sherman as commander-in-chief of the army; and in 1888 was made general. In person, General Sheridan was short and stout, with rather harsh features. In manner he was gruff, but not unkind. He was trusted by his soldiers, who called him «Little Phil» and believed him invincible. He married, in 1879, Miss Rucker, daughter of Gen. D. H. Rucker of the United States army. In religion, General Sheridan was a devout Roman Catholic. He always refused to enter politics. An equestrian statue has been erected in his honor at Albany, N. Y.

Consult Sheridan, 'Personal Memoirs' (1888); Davies, 'General Sheridan' (1895); Newhall, 'With General Sheridan in Lee's Last Campaign' (1866).

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SHERIDAN, Richard Brinsley, English dramatist, orator and statesman: b. Dublin, Ireland, 30 October 1751; d. London, 7 July 1816. His father, Thomas Sheridan, was an actor; his mother was a dramatist and novelist. At the age of seven he was taken to London. From 1762 to 1768 he attended Harrow school, where, in collaboration with a fellow-pupil named Halhed, he wrote a farce called 'Jupiter.' In 1771 he moved to Bath, where he learned at first hand the foibles of the fashionable world. Among the people that he met was the eminent composer, Thomas Linley. Linley's daughter, well-known as a singer, was a lovely and coquettish girl with many admirers. To shield her from the persecutions of a Major Mathews, Sheridan arranged to escort her to a French convent. Near Calais he became secretly married to her; his age was 21 and hers 18. Linley brought them back to Bath and separated them. After his return, Sheridan fought two duels with Mathews, disarming his opponent the first time and being himself seriously wounded the second. On 13 April 1773, he married Miss Linley openly.

At a very early age he began writing for the theatre. On 17 January 1775, his farce-comedy, 'The Rivals,' was produced at Covent Garden. It failed and was withdrawn. In a revised form it reappeared on 28 January, and is still being played. His farce, 'Saint Patrick's Day,' was first acted on 2 May 1775. It was followed on 21 Nov. 1775, by 'The Duenna,' a comic-opera, whose great success eclipsed the popularity of Gay's 'Beggar's Opera.' In 1776 he succeeded Garrick as manager of the Theatre Royal, Drury Lane. He was careless in business, but his personal popularity atoned for his practical shortcomings. He produced a revision of Vanbrugh's 'Relapse,' called 'A Trip to Scarborough,' 24 Feb. 1777. On 8 May 1777, he presented at Drury Lane one of the greatest comedies of all time, 'The School for Scandal.' He was then only 25. A farce called 'The Critic,' in which he satirized his jealous rival, Cumberland, was performed 29 Oct 1779. This practically closed his career as a dramatist; though on 24 May 1799, he produced 'Pizarro,' a melodrama adapted from the German of Kotzebue.

His gaiety and talent made him a great favorite in society. On 12 Sept. 1780 he was elected to the Commons for Stafford, and began a remarkable parliamentary career. He developed wondrous power as an orator, and was unexcelled for brilliancy and eloquence. He was conspicuous in the impeachment of Warren Hastings. On 7 Feb. 1787 his great speech before the House of Commons, relating to the Princesses of Oude, held his auditors enthralled for five hours and a half. Hardly less effective was his speech at the arraignment of Hastings in Westminster Hall, June 1788. Throughout his public career he maintained the reputation of a pure and independent statesman.

His wife died 1792; and on 27 April 1795 he married Esther Jane Ogle. His income from Drury Lane averaged £10,000; but he often overdrew his resources to lead a dazzling social life. From 1791 to 1794 the Theatre Royal was rebuilt at ruinous expense to Sheridan; and the destruction of the new house by fire in 1809 involved him in serious financial difficulties. In 1812 he failed of re-election to Parliament; and in August 1813 he was arrested for debt. His health, weakened by social dissipations, failed rapidly; and he died

almost in want. He was buried in Westminster Abbey. (See RIVALS, THE; SCHOOL FOR SCANDAL).

Consult Oliphant, Mrs. M., *Sheridan* (1883); Moore, Thomas, *Memoirs of Richard Brinsley Sheridan* (1825); Glasgow, Alice, *Sheridan of Drury Lane* (1940); Gibbs, Lewis, *Sheridan* (1947).

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SHERIDAN, Thomas, Irish clergyman, grandfather of Richard B. Sheridan (q.v.): b. County Cavan, Ireland, 1687; d. Dublin, Ireland, Sept. 10, 1738. He was educated at Trinity College, Dublin; was at one time chaplain to the lord lieutenant and later secured a living through Dean Jonathan Swift, of whom he was a close friend. He was noted for his wit and his gay carelessness, though his extravagance had reduced him to direst poverty. He wrote *The Art of Punning,* translated Persius in prose and Sophocles' *Philoctetes* in verse.

His son THOMAS, elocutionist, was father of Richard B. Sheridan, the dramatist (q.v.); b. near Dublin, Ireland, 1719; d. Margate, Kent, Aug. 14, 1788. He was educated at Trinity College, Dublin, became an actor and theater manager and afterward was successful as a lecturer and teacher of elocution. He published *Lectures on the Art of Reading* (1775); *General Dictionary of the English Language* (1780); *Life of Dean Swift* (1784).

SHERIDAN, Wyo., city and Sheridan County seat, altitude 3,738 feet. Settled in 1882, Sheridan was incorporated in 1884. It was named in honor of Gen. Philip H. Sheridan (q.v.). Three major battles with the Indians occurred in this vicinity in the 1860's. Pop. (1940) 10,529; (1950) 11,500.

SHERIF, shĕ-rēf, an Arabic title equivalent to noble. It is borne by the descendents of Mohammed, and descends both in the male and female line. Those who possess this rank are distinguished by green turbans and veils, green being the color of the Prophet. In India they are called sayid.

SHERIFF, an officer who represents the executive power of a county in the United States and is elected either by the legislature or the citizens. The requirements are controlled by statute, but usually they are that the person so elected must be over 21, a citizen of the United States and a resident of the county that he represents. The sheriff in person or by deputy executes civil and criminal process throughout the county; has charge of the prisoners, attends court and keeps the peace. His judicial authority is generally confined to ascertaining damages on writs of inquiry. He is not liable for any errors in acting in a judicial capacity—the office is almost exclusively ministerial. A sheriff has the right, when it is reasonably necessary, to lawfully summon any citizen for assistance in the execution of his duty, and one failing to obey the summons is liable to indictment; he has also the right to appoint general or special deputies in such manner as may be prescribed by his jurisdiction; but the sheriff cannot delegate his authority to appoint a deputy. The sheriff is liable for all damages caused by any wrongful act of his office, and may be criminally liable for a willful breach of his duty, if a corrupt motive is shown. A sheriff's sale is one conducted by a sheriff, or by a person deputized by him, of property held under proper authority.

SHERLOCK HOLMES, Adventures of, a collection of stories by Sir A. Conan Doyle (q.v.), in each of which Holmes figures as a scientific amateur detective of remarkable skill. He is enslaved to cocaine and in manner is brusque and eccentric; but by a method of a posteriori reasoning, applied to apparently unimportant facts of common life, he is enabled to uncover most remote and disconnected causes. The tales are full of bizarre and often gruesome details; the principal characters, Holmes and his friend Dr. Watson, appear to have been suggested to the author by Poe's *Murders in the Rue Morgue.* The first series appeared in the *Strand Magazine,* London, and in book form in 1891.

SHERMAN, shûr'măn, **Forrest Percival,** American naval officer: b. Merrimack, N. H., Oct. 30, 1896; d. Naples, Italy, July 22, 1951. An advocate of unification of the armed services, he was appointed chief of naval operations in November 1949, succeeding Louis Denfeld. Sherman was a distinguished graduate of the United States Naval Academy in 1917. He rose by promotion to the rank of vice admiral in 1946. While serving in the navy in World War I, he acquired a thorough knowledge of naval aviation. He was active in World War II, serving as chief of staff of the air force of the Pacific Fleet. After the invasion of the Republic of Korea by North Korean Communist forces on June 25, 1950, Sherman expanded the Navy's Far Eastern command to about 150 ships within two months, including one heavy and one escort task force.

SHERMAN, Frank Dempster, American poet: b. Peekskill, N. Y., May 6, 1860; d. New York, Sept. 19, 1916. He was graduated from Columbia University in 1884 and subsequently studied at Harvard. For many years he was a professor of graphics at Columbia. He published *Madrigals and Catches* (1887); *Lyrics for a Lute* (1890); *Little Folk Lyrics* (1892); *Lyrics of Joy* (1904); *A Southern Flight* (with Clinton Scollard, 1905); also several volumes of Sherman family history.

SHERMAN, Henry Clapp, American chemist: b. Ash Grove, Va., Oct. 16, 1875. He was graduated at Maryland Agricultural College in 1893 and took his Ph.D. at Columbia University in 1897. After 1897 he was connected with the department of chemistry at Columbia University. He has been research associate of Carnegie Institution since 1912. He is the author of *Chemistry of Food and Nutrition* (1911, 7th rev. ed. 1946); *Food Products* (1914, rev. 1933); *The Vitamins* (1922, 2d ed. 1943); *Foods: Their Values and Management* (1946).

SHERMAN, James Schoolcraft, American politician and vice president of the United States: b. Utica, N. Y., Oct. 24, 1855; d. Oct. 30, 1912. He was graduated at Hamilton College in 1878, was admitted to the bar in 1879, and engaged in practice in Utica. He was mayor of Utica in 1884–1885 and served in Congress in 1887–1891 and 1893–1909. He was for many years promi-

nent in the affairs of the Republican party, was chairman of the Republican State Convention in 1895, 1900 and 1908, and in 1906 he was chairman of the Republican National Congressional Committee. He was elected vice-president of the United States in 1908, but died before the expiration of his term of office. He was renominated for the vice-presidency in 1912, but died a few days preceding the election. He was a trustee of Hamilton College.

SHERMAN, John, American statesman: b. Lancaster, Ohio, 10 May 1823; d. Washington, D. C., 22 Oct. 1900. He was the eighth child in a family of 11, being the junior by three years of his brother Gen. William Tecumseh Sherman (q.v.). He attended about two years at Homer Academy, Lancaster, Pa., between 1835–37. After having secured an irregular and not very complete general education, he studied law and was admitted to the bar at 21. In 1848 he was a delegate to the National Whig convention at Philadelphia. In the same year he married and established a mill for lumber work, which he carried on together with his law practice. He was president of the first Republican convention in Ohio, held at Columbus, 13 July 1855, which nominated Salmon P. Chase for governor. In 1855 he was elected a member of the 34th Congress. He took a prominent part in the proceedings of the House; was on the Committee of Inquiry sent to Kansas, and wrote the report of its investigations. He was prominently identified with the support of all measures for the prosecution of the Civil War; defended the protective tariff, and the refunding of the National debt. He was a member of the committee that visited Louisiana to supervise the counting of the returns of that State, and a member of the Electoral Commission. In Congress, Mr. Sherman quickly demonstrated his exceptional power as a master of finance. He watched carefully the appropriation bills, speedily extended the credit of the government, and provided for its future support. When Salmon P. Chase resigned the United States senatorship from Ohio to enter the Cabinet of President Lincoln, as Secretary of the Treasury, Mr. Sherman was elected his successor and took his seat 4 March 1861. In 1881 he was re-elected to the Senate, where he remained until 1897, when he was appointed Secretary of State by President McKinley. He resigned that office, however, in 1898, on account of failing health. He was a candidate for the Presidential nominations in 1884 and 1888. Among his publications are 'Selected Speeches and Reports on Finance and Taxation' (1879); and 'Recollections of Forty Years in the House, Senate, and Cabinet' (1893). From 1860 to 1900, there was scarcely a great financial measure with which the name of John Sherman was not connected. Among these were the making of United States treasury notes legal tender, the enacting of the national banking bill, the refunding act of 1870, and the resumption of specie payments. The detailed record of measures by which the legal tender notes of the government reached par, and by which specie resumption became an accomplished fact at the time fixed for it, exhibits the man under whose leadership this was done as a financier of the highest order. General Sherman was Secretary of the Treasury in Hayes' administration from March 1877 to March 1881. Consult 'The Sherman Letters: Correspondence between General and Senator Sherman from 1837 to 1891' (ed. by Rachel S. Thorndike, New York 1894); Burton, **T. E.,** 'John Sherman' (New York 1906).

SHERMAN, Roger, American legislator: b. Newton, Mass., 19 April 1721; d. New Haven, Conn., 23 July 1793. He was apprenticed to a shoemaker when a child, but in 1743 he removed to New Milford, Conn., where he was engaged with his brother in keeping a small store. He studied law, politics and mathematics without a teacher, was appointed surveyor for his county in 1745 and for several years made the astronomical observations for an almanac published in New York. In 1754 he was admitted to the bar, served for several terms in the provincial assembly, and in 1761 removed to New Haven, Conn. He became judge of the Court of Common Pleas there in 1765 and served in that position and as judge of the Superior Court for 23 years. He was assistant governor in 1766–85, treasurer of Yale College in 1766–76, and a member of Congress from 1774–91, when he was elected senator in which capacity he served the remainder of his life. He was one of the committee of five to draft the Declaration of Independence which he afterward signed, was an active member of various war and ordinance committees, served on the treasury board and in 1777 was one of the framers of the original Articles of Confederation. He assisted in the codification of the laws of Connecticut, was a delegate to the Federal Constitutional Convention in 1787, where he played a prominent part, and from 1784 until his death was mayor of New Haven.

SHERMAN, Stuart Pratt, American educator, critic and editor: b. Anita, Ia., 1 Oct. 1881; d. near Manistee, Mich, 21 Aug. 1926. He was graduated from Williams College in 1903, and took post-graduate studies at Harvard. He was instructor in English at Northwestern University in 1906–07, and from 1907–24 was on the faculty of the University of Illinois, from 1911 as head of the Department of English. He left this chair in that year to become editor of 'Books,' the literary supplement of the *New York Herald Tribune*. He wrote much on literary subjects, and was co-author of the 'Cambridge History of American Literature.' Other books include 'Americans,' 'The Genius of America,' 'Critical Woodcuts,' 'Main Streams' (posthumous, 1927).

SHERMAN, William Tecumseh, American soldier: b. Lancaster, Ohio, 8 Feb. 1820; d. New York, 14 Feb. 1891; son of Judge Charles R. Sherman. His father died when he was about nine years old, and he was brought up in the family of Hon. Thomas Ewing, who procured for him an appointment as cadet at the United States Military Academy, West Point. He is described as having been at the time a tall, slim, loose-jointed lad, with red hair, fair, burned skin and piercing black eyes. In July 1840 he was graduated from the academy and appointed second lieutenant in the Third artillery, and first lieutenant Nov. 1841. He served in Florida until 1842, and was afterward in garrison at Fort Moultrie, S. C.

At the first rumor of war with Mexico he showed great impatience to be sent to Texas, but the War Department, instead, ordered him to California. The voyage appears to have made him strongly in favor of an interoceanic canal. He served in California as acting assistant adjutant-general of the department until February 1849, when he was transferred to similar duty on the staff of Gen. Persifor F. Smith who commanded the division of the Pacific. Having been ordered to New York as bearer of dispatches, he was married in January 1850 to Ellen Boyle, daughter of his foster-father, Hon. Thomas Ewing, then Secretary of the Interior.

In September 1850 Sherman was transferred to the commissary department with the rank of captain and stationed at Saint Louis and New Orleans. Shortly after his arrival at New Orleans he received notice of his appointment as partner in the banking firm of Lucas and Turner, a branch of Lucas and Simonds, of Saint Louis. Feeling that he could do better in business than in the army, he obtained a six months' leave of absence and started for California to represent the house. When the leave of absence expired he resigned from the army. Sherman at this time saw the danger of the slavery issue. "Unless people both North and South," he wrote in August 1856, "learn more moderation we'll see sights in the way of civil war."

Sherman removed to New York in 1857, and to Leavenworth, Kan., in 1858, where he practised law until July 1859, when he was elected superintendent of the proposed military academy in Louisiana. The institution was opened 1 Jan. 1860, as the Louisiana State Seminary of Learning and Military Academy, and Sherman remained its superintendent until 18 Jan. 1861, when he wrote to the governor asking to be relieved the moment the State determined to secede. His request having been granted, he went to Saint Louis in February 1861 and was for a short time president of a Saint Louis railroad company. While holding this place he was deeply interested in the approaching struggle between North and South, making valuable suggestions, some of which were shown by his brother, John Sherman, then in Congress, to Secretary of War Cameron. "On the necessity of maintaining a government, and that government the old constitutional one," he declared, "I have never wavered, but I do recoil from a war when the negro is the only question."

In May 1861 Sherman was appointed colonel of the 13th regular infantry, and 30 June he assumed command of a brigade of McDowell's army. He took an honorable part in the first battle of Bull Run; on 3 August received his commission as brigadier-general of volunteers, dating from 17 May, and 24 August was ordered to duty in the Department of the Cumberland, under Gen. Robert Anderson, whom he succeeded in command of the department 8 October. On the 26th of the same month he wrote that "to accomplish the only purpose for which Kentucky can be used there should be a force here of 200,000 men." In November Sherman, who was severely criticized by many for his assertions as to the number of men needed for the war in his section, was relieved of his command and sent to Missouri. After a short leave at home he was employed for a time as commander of the camp of instruction at Benton Barracks, near Saint Louis. In February 1862 he was transferred to Paducah, Ky., where he organized the division which he subsequently commanded at Shiloh. In this hard-fought, two-days' conflict Sherman was severely wounded, and Grant declared that "tc his individual efforts I am indebted for the success of that battle." Sherman was commissioned major-general of volunteers, 1 May, and in the same month compelled the Confederates to evacuate Corinth, which was followed, in July, by the occupation of Memphis. His campaign against Vicksburg proved unfortunate. He was defeated and driven back to Chickasaw Bayou, but afterward rendered effective aid to Grant in the operations which resulted in the surrender of Vicksburg.

Sherman was made a brigadier-general of the regular army in July 1863. After the fall of Vicksburg and Port Hudson the Western armies lay comparatively idle for a time, and early in the autumn Sherman was occupied in rebuilding the Memphis and Charleston railroad to the East, that the armies might draw supplies by that route. While engaged on this work he was ordered to cross the Tennessee and march eastward. The battle of Chattanooga, in which he distinguished himself, followed, and he was next sent to the relief of Burnside, besieged by the Confederates in Knoxville. Sherman forced Longstreet to raise the siege 5 Dec. 1863. After a few weeks in winter quarters in northern Alabama, Sherman in January 1864 made a raid across the State of Mississippi from Jackson to Meridian and back again, doing a vast amount of damage to railways, Confederate property and the country at large. Grant being invited to take unhampered command of the military forces of the United States and to repeat, if possible, in the East, the successes which had attended his career in the West, assigned Sherman to the command of the Military Division of the Mississippi, including the Departments of the Ohio, the Tennessee, the Cumberland, and the Arkansas, with temporary headquarters at Nashville, and with orders to move on Atlanta. With an army of about 100,000 men Sherman invaded Georgia. He was opposed by Gen. Joseph E. Johnston, with about 45,000 Confederates in excellent spirit and discipline, but poorly provided with munitions of war, as compared with the Union forces. Johnston engaged Sherman's army at Dalton, Resaca, Cassville, Dallas and Kenesaw Mountain. At the last-named place, 27 June, the Confederates, owing to the shortness of artillery ammunition, reserved their cannon for the final charge of the Union troops, receiving them with a destructive fire which won the day for the South.

Sherman's progress, however, could not be stayed, and the Richmond government, believing that Johnston was not doing all that could be done with the men at his command, relieved him and put Hood in his place. Sharp battles followed in the vicinity of Atlanta, and at length Hood was compelled to evacuate the city during the night of 1 September. Sherman issued an order that all the inhabitants should leave Atlanta, going North or South as they

saw fit, and offered transportation to that end. Mayor Calhoun and other citizens appealed in vain to have the order recalled. "You cannot qualify war in harsher terms than I will," answered Sherman, "war is cruelty and you cannot refine it." The order was carried out and approved by the authorities at Washington. Sherman gave as his reasons to his military superiors that he wanted all the houses for military and storage purposes, and did not wish to be burdened with the care of the inhabitants.

Sherman became convinced, after a series of indecisive operations against Hood, that the aim of the latter was to draw him out of Georgia. He determined on marching to the sea, cutting a swath of devastation through the heart of the Confederacy and destroying, as far as possible, the sources of Confederate supplies. Grant fully approved of the plan, and Sherman, after burning Atlanta, breaking up the railway, and sending a part of his army to reinforce Thomas at Nashville, started with about 70,000 men on his memorable march. He ordered his troops to forage liberally on the country and although foraging was supposed to be done by regular details only, it was, in fact, carried on practically without restriction, and the devastation along the line of march was most complete. The Confederates had virtually no force to oppose Sherman's advance and when the governors of Alabama, South Carolina and Georgia were appealed to from Richmond, the first mentioned replied that none but cripples, women and children, and very old men were left in the state. Sherman entered Savannah December 23, having lost on his march from Atlanta, 103 killed, 428 wounded and 278 missing. Congress, Jan. 10, 1865, tendered the thanks of the people of the United States to Sherman and his command. He moved northward February 1 and occupied Columbia February 17, the place being destroyed by a conflagration for which Sherman always claimed that he was not responsible.

General Johnston was recalled to command by the chiefs of the sinking Confederacy, and after several desperate encounters, Sherman and Johnston met at Durham Station, N. C., April 18. The terms agreed upon were most liberal to the Confederates allowing them to deposit their arms at their state capitals, and providing for the recognition of their state governments. The terms were made subject to the approval of superior authority, and a suspension of hostilities was agreed upon to obtain that consent, 48 hours' notice to be given by either side before resuming hostilities. Lincoln had been murdered; there was a vindictive feeling toward the South at Washington, and Johnson and his cabinet wholly disapproved Sherman's arrangement, and ordered Grant to take charge of Sherman's command. Grant, always generous in his recognition of Sherman's merits, went to Raleigh, as directed, but left to Sherman the honor of receiving Johnston's surrender on the same terms as those granted to Lee. Sherman keenly felt what he regarded as unjust treatment on this occasion by Secretary of War Stanton and declined publicly to take Stanton's proffered hand at the great army review in Washington May 24, 1865.

Sherman was appointed to command the military division of the Mississippi June 27, 1865; promoted to lieutenant-general July 25, 1866, and assigned in August to the military division of the Missouri. On the accession of Grant to the presidency, Sherman succeeded to the command of the army as general. About this time he wrote, "I do think some political power might be given to the young men who served in the rebel army, for they are a better class than the adventurers who have gone South purely for office." Sherman retired Feb. 8, 1884, taking, to the last, an active interest in public affairs. A splendid equestrian statue, by Saint-Gaudens, presenting Sherman in characteristic attitude as when he rode at the head of his army, was unveiled at the southeastern entrance of Central Park, New York, in 1903, and another handsome equestrian statue of the great general was dedicated in Washington the same year, President Roosevelt taking part in the ceremonies. The Washington statue stands on the spot where Sherman reviewed the grand march of the Union army in 1865.

Consult *Memoirs* (autobiography, New York 1875); Liddell-Hart, B. H., *Sherman—Soldier, Realist, American* (New York 1929); Burne, A. H., *Lee, Grant, Sherman* (New York 1939); Lewis, L., *Sherman, Fighting Prophet* (New York 1932, new ed., 1939).

SHERMAN, city, Texas, and Grayson County seat, altitude 720 feet; on the Frisco Lines; the Missouri-Kansas-Texas of Texas; the St. Louis Southwestern; the Southern Pacific, and the Texas Electric railroads; on bus and motor-freight lines, with state and federal highways; by rail, 64m. N. of Dallas. Sherman is 14m. S. of the Red River which forms a portion of the boundary between Texas and Oklahoma. In the northern part of the county the soil is a sandy loam, producing large quantities of fruit and vegetables; a large acreage is planted in onions. The southern section of the county, with its black earth, grows cotton and grain. Sherman, located centrally in the county, is a trade center and a distributing point for farm crops and livestock, as well as a manufacturing and industrial center. Cotton is a basic factor in the city's industrial structure; its processing and use in manufacture support cotton gins, cottonseed mills, and textile mills. A large industry is carried on in railroad and machine shops and iron works. Industrial products include harnesses, mattresses, oleomargarine shortening, corrugated boxes, and condensed milk. Sherman has 28 churches of various denominations and two hospitals. The school system includes five elementary public schools, one parochial school, and a public high school. The city is liberally supplied with parks, playgrounds, and recreational centers. It is the seat of Austin College, founded at Huntsville in 1849 and removed to its present location in 1876. Two ex-presidents of the Republic of Texas, Sam Houston and Anson Jones (qq.v.), were members of the original board of trustees. Sherman also has a Carnegie library, and a library at the college. Among the social, civic, and service clubs the musical organizations are prominent. Fourteen miles north of Sherman on the Red River is the $51,000,000 hydroelectric government project. In 1857 John Butterfield, proprietor of a transportation service between St. Louis and San Francisco, routed his stages through Sherman, and long-distance transportation of passengers and goods contributed to the growth of the settlement. Incorporated as a town in 1858, Sherman was chartered as a city in 1895. The city's name honors Gen. Sidney Sherman, commander of cavalry at the battle of San Jacinto.

Sherman has commission government with a

city manager. The first courthouse erected at what is now the city of Sherman was a log structure, which is said to have been torn down in 1857 to settle a bet as to whether or not a certain duck had her nest under the building. Pop. (1950) 20,150.

SHERMAN ACT, an act of the United States Congress, approved July 2, 1890. The passage of the act gave legislative expression to the American faith in an economic system predicated upon the theory of free competition. It is directed to the protection of interstate and foreign commerce from unreasonable restraints, monopolization and attempts to monopolize, and from combinations and conspiracies to achieve these ends. Violations are made misdemeanors punishable by a fine or imprisonment not exceeding one year, or both. Persons injured by activities which are illegal under the act may sue for treble damages and the courts are empowered to enjoin violations and dissolve illegal combinations and monopolies. The act defines the illegal activities in general terms. However, supplementary and amendatory statutes and the numerous judicial decisions interpreting the act have defined with particularity many of the specific business practices and activities condemned. The Sherman Act, Clayton Act, Federal Trade Commission Act and related statutes constitute a body of laws known as the Federal Antitrust Laws. See ANTITRUST LAWS; TRUSTS, THE GROWTH AND CONTROL OF.

An act of Congress approved July 14, 1890, relating to the purchase of silver by the United States Treasury, is also sometimes referred to as the Sherman Act.

SHERRIFF, shĕr'ĭf, **Robert Cedric,** British author: b. Kingston-on-Thames, June 6, 1896. He started his business career as an insurance clerk, with a great interest in sports. He served with the British Army during World War I and was wounded at Ypres. Returning to his insurance career in 1918, he began writing amateur plays for the Kingston Rowing Club. *Journey's End* (q.v.), based on his war experiences, was one of these. Finally produced professionally in 1929, this play became an international success. He wrote several other plays and novels (*The Hopkins Manuscript,* 1939), none of which became as famous.

SHERRILL, Charles Hitchcock, American lawyer: b. Washington, D.C., April 13, 1867; d. Paris, France, June 25, 1936. He was educated at Yale, and was admitted to the bar in 1891. In 1909 he was appointed minister to Argentina, and in 1911 retired from the diplomatic service on account of ill health after having declined appointment as ambassador to Japan. He published *Stained Glass Tours in France* (1908); *Stained Glass Tours in England* (1909); *Stained Glass Tours in Italy* (1913); *Prime Ministers and Presidents* (1922); *A Year's Embassy to Mustafa Kemal* (1934).

SHERRINGTON, shĕr'ĭng-tŭn, SIR **Charles Scott,** English neurophysicist: b. London, Nov. 27, 1857; d. Eastbourne, England, March 4, 1952. Co-winner of the Nobel Prize for physiology and medicine in 1932, he was a specialist in fields dealing with the brain and the nervous system.

Sir Charles' research on the nervous system is considered by some authorities as a basis for understanding the physiology of the brain and the nerves, and thereby expanding the field of brain surgery. His findings demonstrating the effect of reflex actions in facilitating the nervous system to function as a unit culminated in his publication of *The Integrative Action of the Nervous System* (1906; rev. eds. 1929 and 1948). Knighted in 1922, he received the Order of Merit, Britain's highest award for achievement, in 1924, and in 1932 he shared the Nobel Prize with Edgar D. Adrian for their joint discoveries concerning the functions of neurons.

After his retirement from the Waynflete chair of physiology at Oxford in 1936, Sir Charles turned to philosophic writings, his *Man on His Nature* (1940; 4th ed. 1946) arousing wide discussion.

SHERRY, shĕr'ĭ, a white Spanish wine which is grown in a small region between the mouths of the Guadalquivir and Guadalete, and is named from Jerez, the center of the sherry industry. The grapes, both red and white, are fully matured, and natural sherry is somewhat harsh. Condensed wine liqueur, sugar, and spirit are usually added, and the resultant wines are blended to the required taste. The two chief varieties are the pale, or dry, and the brown, or sweet. Typical of the former is Manzanilla; of the latter Amontillado. Other brands are called Fino, Oloroso, and Vino de Pasto. Sherry improves by keeping. It is a delicate, full-bodied wine of rich flavor. See WINE AND WINE MAKING.

SHERWOOD, shûr'wo͝od, **Robert Emmet,** American playwright: b. New Rochelle, N. Y., April 4, 1896; d. New York, Nov. 14, 1955. He was educated at Milton Academy and Harvard University, where his schooling was interrupted by World War I. He joined the 42d Battalion of the Canadian Black Watch and was wounded while participating in major battles of France. Harvard conferred an A.B. degree on him in 1918. His career in journalism began at *Vanity Fair* magazine, where he was dramatic critic from 1919 to 1920. His first play *The Road to Rome* (1927) was an immediate success. An historical play, with Hannibal as a main character, it showed Sherwood's great interest in peace and the futility of war which have provided the themes for the majority of his plays. He followed it with *The Queen's Husband* (1928), *Waterloo Bridge* (1929), *This is New York* (1930), and *Acropolis* (1933).

His later plays have been tremendously successful. He was awarded a Pulitzer Prize for *Idiot's Delight* (1936), *Abe Lincoln of Illinois* (1938), and *There Shall Be No Night* (1940). His two other plays of the period were *The Petrified Forest* (1934) and *The Rugged Path* (1945). He wrote the musical comedy *Miss Liberty* (1949) in collaboration with Moss Hart and Irving Berlin.

During World War II, Sherwood served overseas with the United States Office of War Information and was also a literary adviser to President Franklin D. Roosevelt in preparation of his speeches. His biography *Roosevelt and Hopkins* (1948) was awarded the 1949 Pulitzer Prize in biography and the 1949 Bancroft Prize for historical writing.

SHERWOOD FOREST, an ancient forest, England, in the west of Nottinghamshire, in a

hilly district between Nottingham and Worksop. The tract covered about 200 square miles and was formerly a royal forest, famous as the scene of the exploits of Robin Hood and his merry men, many legends of whom are yet to be heard in the surrounding country. Only a small portion of the forest, near Rotterham, still remains. The rest of the country it once covered is now occupied by country seats and private parks, and is for the most part bare of trees. The town of Mansfield and several villages are within the ancient bounds, which were about 25 miles from north to south and six to eight miles from east to west.

SHETLAND, shĕt'lănd or **ZETLAND,** zĕt'lănd, group of islands off the northern coast of Scotland. The Orkneys lie between them and the mainland. They number about 30, and in addition there are some 70 uninhabited islets. The area is 551 square miles. The largest island is Mainland.

The chief industries are the breeding of cattle and sheep, and fishing. Oats, barley, and potatoes are grown. Shetland ponies are bred, and there are some domestic industries. Lerwick is the capital. The islands are thought to have been the Ultima Thule of classical writers. They were part of Norway from 875 to 1468, when they were ceded to Scotland. Pop. (1951) 19,343.

SHEWBREAD, shō'brĕd, the 12 unleavened loaves placed upon a table in the outer department of the Jewish sanctuary. The number 12 represented the 12 tribes. The loaves were placed in two piles, one above another, and were changed every Sabbath day by the priests. The removed bread became the property of the priests, who alone had a right to eat of it, and only in the holy place. In cases of emergency, however, they incurred no blame by giving it to persons who were in a state of ceremonial purity, as in the instance of David and his men (I Samuel 21:4-6; Matthew 12:4).

SHIBBOLETH, shĭb'ô-lĕth, a word which on a certain occasion served as a test to distinguish Ephraimites from Gibeonites. Jephtha's men, Gibeonites, held the ford of Jordan, with orders to suffer no Ephraimite to cross over. When challenged with the question "Art thou an Ephraimite?" the man of Ephraim would answer "Nay." "Say now Shibboleth"; and the other pronounced it "Sibboleth," "for he could not frame to pronounce it right." In the Septuagint version, which is followed by the Latin Vulgate, the "point" of the question is completely lost: "Art thou not an Ephraimite?" and they said "Nay." And they said to him, "Then say *stachys,*" that is, "say ear" (of corn), which is the etymological meaning of the Hebrew word shibboleth: "and he framed not to speak so."

SHIBUSAWA, shê-bōō-sä-wä, Viscount **Ei-ichi,** Japanese banker: b. Saitama prefecture, Feb. 2, 1840; d. Tokyo, Nov. 10, 1931. He entered government service at Tokyo under the Tokugawa shogunate when still a youth. Upon the establishment of the imperial government in 1869 he was appointed to a high office in the treasury, but resigned in 1873 and held no other government position, despite frequent offers. He founded the first national bank, known as the First Bank, in 1873, and became a power in the Japanese financial world. In 1905 illness forced his retirement from business. He returned to active life for a short time after the Russo-Japanese War. He visited the United States in 1902, 1909, and 1915.

SHIDEHARA, shê-dĕ-hä-rä, Baron **Kijuro,** Japanese diplomat: b. Osaka, Japan, Aug. 11, 1872; d. Tokyo, March 10, 1951. Active in the Japanese diplomatic service since 1895, Shidehara was chosen by the Japanese emperor in 1945 to act as prime minister until a representative Diet could be elected. He was the speaker of the Japanese House of Representatives up to the time of his death.

He entered the Japanese diplomatic service on his graduation from the Law College of Tokyo Imperial College (1895), and in 1899 served at the Japanese consulate in London. In succession he was secretary at the head office in Japan (1911–1912), counselor to the Japanese embassy in Washington (1912–1913), counselor to the embassy in London (1913–1914), and minister to the Netherlands (1914–1915). From 1915 to 1919 he served as vice minister of foreign affairs in the Japanese Cabinet, and in the latter year was appointed ambassador to the United States, serving until 1922. During this time he was a delegate to the Washington Naval Disarmament Conference (1922). From 1924 to 1931 he was minister of foreign affairs in six of the seven Japanese cabinets, serving in 1930 as acting prime minister during the illness of Yuko Hamaguchi. He retired in 1931, yielding to a more militaristic government.

Recalled from his retirement in 1945 to serve temporarily as prime minister until national elections could be held, he resigned this position on April 22, 1946, but remained acting premier until Shigeru Yoshida was installed as premier on May 22. Shidehara was named vice premier in the Yoshida Cabinet.

SHIELD, shēld, **William,** English composer: b. Swalwall, Durham, March 5, 1748; d. London, Jan. 25, 1829. His earliest sustained work was a comic opera, *The Flitch of Bacon* (1778), and having been appointed composer to Covent Garden (1778–1797), he produced *Rosina* (1783); *The Poor Soldier* (1784); *The Woodman* (1792); *Two Faces Under a Hood* (1807). But he is best known by his songs, among which are *The Heaving of the Lead; The Arethusa; The Thorn; O Bring Me Wine; The Ploughboy;* and *The Wolf.*

The tune of *Auld Lang Syne,* as now sung, was introduced into his *Rosina;* the authorship of *Coming through the Rye* has also been claimed for Shield.

SHIELDS, shēldz, **Charles Woodruff,** American educator: b. New Albany, Ind., April 4, 1825; d. Newport, R. I., Aug. 26, 1904. He was graduated from Princeton in 1844, from the Theological Seminary there in 1847, was ordained in the Presbyterian ministry and served in charge of pastorates at Hempstead, L. I., in 1849–1850, and in Philadelphia, Pa., in 1860–1865. He later occupied the chair of harmony of science and revealed religion at Princeton. His publications include *The Presbyterian Book of Common Prayer according to the Revision of the Westminster Divines* (1864); *Religion and Science in Relation to Philosophy* (1875); *The Order of the Sciences* (1882); *The*

United Church of the United States' (1896); 'The Scientific Evidences of Revealed Religion' (1900), etc.

SHIELDS, James, American military officer: b. Dungannon, Ireland, 1810; d. Ottumwa, Iowa, 1 June 1879. He came to the United States in 1826 and entering the army subsequently served through the Mexican War and for bravery in the battles of Cerro Gordo and Chapultepec was brevetted major-general. He was United States senator from Illinois in 1849 and from Minnesota in 1857. During the Civil War he especially distinguished himself by defeating «Stonewall» Jackson at Winchester, 23 March 1862. He was defeated at Port Republic 9 June 1862 and resigned his commission in 1863.

SHIELDS, John Knight, American lawyer, jurist and senator: b. Clinchdale, Tenn., 15 Aug. 1858. He was privately educated and was admitted to the bar in 1879, practising thereafter at Knoxville, Tenn. He became associate justice of the Supreme Court of Tennessee in 1902, and was chief justice of that court in 1910–13. He was elected to the United States Senate in 1913; re-elected in 1918, but was defeated for renomination in 1924. D. 30 Sept. 1934.

SHIELDS, England, the urban aggregation of North and South Shields, two separate municipalities and important seaports in Northumberland and Durham respectively, on opposite banks of the Tyne, near its mouth in the North Sea. The port of Shields, formed by an expansion of the river into a wide bay, has been greatly improved and deepened by dredging and the construction of piers, and accommodates vessels of any size at their quays. There is a very extensive trade, particularly in coal, of which more than 2,500,000 tons were shipped a year before the war.

North Shields, on the north bank of the Tyne, forms part of the municipality and parliamentary borough of Tynemouth (q.v.) together with three small townships. It extends about one mile along the river, and consists of an old and a modern portion, the former with narrow streets and lanes, and the latter with spacious streets and squares. The township extends up the river to Willington, and includes Northumberland Dock and Albert Edward Dock. The chief industrial establishments are shipbuilding yards, saltworks, iron foundries, marine-engine works, and electrical works. Fishing is largely carried on, and much fish is sent to many parts of England. Pop. 63,788.

South Shields, opposite North Shields, communicates with the latter by steam-ferries. The Saint Hilda coal-mine in the town was opened in 1810. The old part of the town consists of long narrow streets running parallel to the river; but the modern part, immediately behind, occupies a higher site and possesses many handsome buildings. The public institutions include a town hall, police buildings (1893), a custom-house, free library and museum, infirmary, fever hospital, public baths and washhouses; nautical college, national and other schools and several benevolent endowments. The harbor is lined with ship and boat yards and factories. The chief industries are coal-mining and coal shipments, shipbuilding and ship-repairing, marine-engine and boiler-making, and the manufacture of glass, earthenware, chain-cables, rope and anchors. Coal is shipped principally at the Tyre docks, area, 50 acres, belonging to the North-Eastern Railway Company. The first lifeboat was built in South Shields and put to sea 30 Jan. 1790. A stone pier a mile long has been constructed at the mouth of the harbor. Pop. 119,600.

SHIELDS. Weapons of defense held before the bearer to protect against blows or projectiles. The shield has been probably universally used by all nations and tribes from that early period when the human being needed an outdoor defense. The early Greeks had their circular shield (*aspis*) of leather or felt, and the *sakos* or oval shield. The ancient descriptions show how these shields were beautified, as the metal one of Achilles made by Hephaistos (according to Homer) with its embossed scenes, that of Heracles in Hesiod's description. Often they had individual badges painted on them (forerunners of the knights' heraldic shields), a custom borrowed from the Persians. The Romans, Diodorus says, at first used square shields, then the *aspis,* and later the large circular iron *clypeus* and the four cornered four-foot-long *scutum,* of wood. Later the light circular *parma* of leather was used by the *velites.* Old Roman bas-reliefs show us also hexagonal shields. The shields of the Gauls (*pavoises*) were so great they crossed rivers in them. The shield of the crusaders was pointed (*heater*-shape). The English buckler and the Scotch targe are old subjects for painters and poets. The shields of the knights or of heraldry are very varied in form changing with the different periods and methods of combat. The «heater» shape was in use in the 12th, 13th and 14th centuries; in the 14th century the sides often ran parallel, the top was still a straight line but the bottom was almost a half round. Then the tilting shields began to appear and indentations were made in the side (termed «bouches») to allow for the passage of the lance, these were very much smaller than the triangular shield of the warrior on foot. But the actual shield of the knight soon passed into the art of heraldry, to be known generally as a *scutcheon,* and assumed fantastic shapes that were never seen in combats; even the distaff (woman) side of the «house» receiving a shield of «lozenge» (diamond) form. A very natural evolution from the decorative shield of heraldry was that to the shield as an accessory in ornament, when it took the place of the *cartouche.* In the decorative arts the shields are endless in form, their decorative curling and curving straps being derived from the metalworkers' beaten cartouches worked up to ornament the gates and doors of the different periods. Perhaps the most extravagantly decorative shield forms are those of the Renaissance, baroque, and rococo periods. Shields have been much utilized as a motif by artists in their decorative «trophy» groupings, and to the present day there is no more favored device in every branch of Art, including architecture, than the shield form.

Clement W. Coumbe,
Technical Art Expert.

SHIITES, shē'īts, or **SHIAH,** that sect or party of Mohammedans who assert the rights of Ali (q.v.), the son-in-law of the Prophet, and his descendants to be the true line of

Caliphs, as opposed to the Sunni or Sunnites (q.v.), who uphold the succession of the Caliphs Abu Bekr. The divergence — not unmixed with animosity — that exists between the two sects is similar to that of Protestants and Roman Catholics of former times, and constitutes even to-day the weakest point in the armor of Islam. The Persians and most of the Moslems in India are Shiites, while the Turks and many Arabs adhere mainly to the Sunni faction. The Persians adopted the Shiah doctrines in 1500, since when they have been the national law and religion of that country. Yet neither creed is pure and unadulterated, for each is again subdivided into smaller schisms. (See HASAN and HUSAIN; MOHAMMED; OMMIADS). Consult Muir, W., 'The Life of Mohammed' and 'The Caliphate' (London).

SHIKARPUR, shĭk-är-poor', India, (1) a former district in Sind, Bombay, comprising the four subdivisions of Rohri, Sukkur, Larkana and Mehar. The two first now form the Sukkur district and the other two (since 1901) the district of Larkana. (2) A subdivision of the Sukkur district (see above), composed of the Shikarpur, Naushahro Abro and Sukkur *talukas* or departments. (3) Shikarpur Taluka of Sukkur district, Sind, Bombay, has an area of 492 square miles and a population of about 110,000. It contains one town, Shikarpur (see below) and 88 villages. (4) Town, headquarters of the *taluka* of the same name in Sukkur district, stands in a tract of low-lying country which is annually flooded by canals from the Indus (18 miles west). The soil is rich, producing grain and fruit. Its buildings have been much improved in recent years. There is a famous bazaar with a flourishing trade, owing to the town's position on one of the great routes from Sind to Khorassan *via* the Bolan Pass. There are 17 government schools — one high school, 12 for boys and four for girls (two each for Hindus and Mohammedans), and several private schools (one English). The principal manufactures are carpets and coarse cottons; the more important exports are indigo, metals, henna, spices, groceries, opium, horsecloths, dry grains and silks. Since the Municipal Act of 1855 great sanitary improvements have been effected. Pop. 55,503, about one-third Mohammedans and the rest Hindus. (5) Shikarpur Taluk, the northern department of Shimogo district, Mysore; area, 429 square miles; pop. about 70,000. The jungle harbors tigers, leopards and other wild animals. The headquarters is also named (6) Shikarpur Town; pop. 5,568. (7) A town in the district of Bulandshahr, United Provinces; pop. about 13,000. The American Methodists maintain a branch mission here.

SHILKA, shĭl'kä, a river of Asia, in eastern Siberia, rises among the Yablonoi Mountains and is one of the two rivers (the other is the Argun) which by their union form the Amur, into which it empties at a point beyond Ust Strelka. The Shilka flows from Mount Kentai in the Khan-ula range (Chinese Mongolia) mostly through Russian territory, before reaching which it is known as the Onon. It is about 320 miles long and navigable about one-half of the year. In winter its frozen bed is utilized as a highway. Sretensk is an important station on the river for vessels going to Khabarovsk. It is a terminus of the Trans-Siberian Railway and the starting point of Russian expeditions to the Lower Amur.

SHILLABER, shĭl'ą-bėr, **Benjamin Penhallow**, «MRS. PARTINGTON,» American humorist: b. Portsmouth, N. H., 12 July 1814; d. Chelsea, Mass., 25 Nov. 1890. After a brief secondary schooling and training in a local printer's office, he went to Boston, where he followed his trade in several newspaper offices, with the interruption of a year's visit to British Guiana. Then he began journalistic work. Achieving from the first (1847) a great success with his 'Sayings of Mrs. Partington,' whose homely wisdom is closely allied to that of the Widow Bedott. In Boston he was successively an editor of the *Post* and editor-in-chief of the *Carpet-Bag*, a humorous publication of short-lived fame, and of the *Saturday Evening Gazette* (1856–66). Shillaber's work was not, as one critic has phrased it, «trained to move in literary circles,» but in that it was similar to most American humor of its period. Among the titles of his books are 'Rhymes with Reason and without' (1852); 'Life and Sayings of Mrs. Partington' (1853); 'Mrs. Partington's Knitting Work' (1857); 'Partingtonian Patchwork' (1872); 'Lines in Pleasant Places' (1875); 'Ike and his friend' (1879); and 'Cruises with Captain Bob' (1880); 'Wideswathe' (1884).

SHILLELAGH, shĭ-lā'lä, the cudgel of blackthorn or oak carried by the conventional Irishman, with which he is supposed to delight to play on the heads of his friends on occasion. The name is borrowed from the once famous oak forest of Shillelagh in the southwest corner of County Wicklow, 17 miles southwest of Aughrim. There are about 12 ways of spelling this word.

SHILLING, the name of an English silver coin and money of account since the Norman Conquest, of the value of 12 pence, or the 20th part of a sovereign or pound sterling; and equivalent in the United States to about 24⅓ cents. In the United States, a denomination of money formerly in use, differing in value relatively to the dollar in different States, but below that of the English shilling with a corresponding value for the penny and the pound. An exhaustive history of the shilling may be found in the great Oxford Dictionary of Sir J. A. H. Murray (1888 et seq.).

SHILOH, shĭ'lō, (1) Palestine, occupied the summit of a high mountain north of Bethel. Its modern name is Seilun. The Ark of the Covenant or Tabernacle (q.v.) rested here from the time of Joshua to that of Eli, when it was carried away by the Philistines. Prior to this Shiloh was the religious seat of the Israelites and a great feast was held annually. The phrase of the Scriptures, «until Shiloh come,» has received considerable attention from theologians, and its accepted interpretation is— «until Christ come,» or «until rest come.» A small village site, 20 miles north of Jerusalem, is identified with the ancient Shiloh. (2) A settlement in Cape Colony, South Africa, in the district of Queenstown, 60 miles northwest by west of King William's Town. (3) There is

one village of this name in Alaska and there are 16 in the United States.

SHILOH, shī'lō (Tenn.), **Battle of.** This engagement, known also as Pittsburgh Landing, was fought 6–7 April 1862, between the Union forces of General Grant, commanding the Army of the Tennessee, and of General Buell, commanding the Army of the Ohio — the latter arriving the night of the first day — and the Confederate Army of the Mississippi under Gen. A. Sidney Johnston, with Gen. P. G. T. Beauregard second in command.

After the battles of Mill Springs and Fort Donelson (qq.v.) Johnston withdrew from Kentucky and Tennessee to the line of the Memphis and Charleston Railroad, and soon after concentrated his army at Corinth, Miss. The Union forces were sent up the Tennessee River under Gen. C. F. Smith, Grant having been ordered by General Halleck to remain at Fort Henry (q.v.), Gen. W. T. Sherman, commanding the advance and seeking to cut the railroad, finding the country above Pittsburgh Landing under water, fell back to that point, and recommended its occupation to General Smith, who had remained at Savannah. Sherman established his division 19 March at Shiloh Church, about two and a half miles back from the Landing, General Hurlbut's division having been encamped one mile out from the river. Grant, having been restored to command, reached Savannah 17 March and sent McClernand's and C. F. Smith's division under W. H. L. Wallace to Pittsburgh. Prentiss' division followed later. Little or no attention was paid to lines of battle or reserves, both Grant and Sherman looking upon the concentration as preparatory to an advance upon Corinth. Gen. Lew Wallace's division was established at Crump's Landing, some six miles below, where, as Grant explained to Halleck, he had a good road which would enable him "to form a junction with the main column, . . . six or seven miles before reaching Corinth."

In regard to this move, Halleck, 20 March, telegraphed: "By all means keep your forces together until you connect with General Buell, and wait till you are properly fortified and receive orders." No attention was paid to this direction as to fortifying, and neither abatis nor rifle-pits were constructed, nor timber felled. Grant in his 'Memoirs' says of this, "When all reinforcements should have arrived I expected to take the initiative by marching on Corinth, and had no expectation of needing fortifications, though this subject was taken into consideration." The further reason given by Grant was that the proper line for fortifying was in rear of the camps as they ran, and could not be easily supplied with water. Sherman, in his 'Memoirs,' writes: "We did not fortify our camps against an attack, because we had no orders to do so, and because such a course would have made our raw men timid"; and in a court-martial case he testified: "To have erected fortifications would have been an evidence of weakness, and would have invited an attack." There was no expectation of an attack. Grant, in his 'Memoirs,' says: "The fact is, I regarded the campaign we were engaged in as an offensive one, and had no idea that the enemy would leave strong intrenchments to take the initiative when he knew he would be attacked where he was if he remained." General Nelson, the advance of Buell on the march from Columbia, telegraphed Grant on 3 April that he could be at Savannah 5 April, and in reply was informed Friday, 4 April, that he need not hurry, as boats could not be ready to take him to Pittsburgh until the 8th. The same day Grant notified General Prentiss: "The review of your division will not take place until Tuesday next." Two days before the time fixed for review Prentiss and his division were prisoners in the hands of the enemy. This conviction that there would be no attack led not only to neglecting all defensive preparations, but to selecting camp-grounds without regard to a line of battle and chiefly with reference to available ground and the convenience of water. Three of Sherman's brigades were established about Shiloh Church and the fourth two miles distant. This wide space was later filled in part by Prentiss' division, leaving extensive gaps on each of his flanks. According to maps of both Grant and Sherman, McClernand's division was camped to the left and rear of Sherman, and nearly at right angles to the latter, with its flank toward the enemy's position. Hurlbut's division was a mile in rear of Prentiss, and W. H. L. Wallace's about the same in rear of Sherman.

There had been a considerable show of Confederate cavalry several miles to the front 4 April, but on the 5th Sherman wrote Grant: "All is quiet along my lines now. We are in the act of exchanging cavalry according to your order. The enemy has cavalry in our front, and I think there are two regiments and one battery six miles out." The same day one of his regiments had been engaged under his orders in cutting a road and bridging a creek in his front for the advance on Corinth. Later in the day Sherman wrote Grant: "I have no doubt that nothing will occur to-day more than some picket-firing," and that he did not "apprehend anything like an attack" on his position. The same day, after Sherman's report from the front, Grant, who had gone back to Savannah for the night, telegraphed Halleck: "I have scarcely the faintest idea of an attack (general one) being made upon us, but will be prepared should such a thing take place. General Nelson's division has arrived. The other two of General Buell's column will arrive to-morrow and next day. It is my present intention to send them to Hamburg, some four miles above Pittsburgh, when they all get here. From that point to Corinth the road is good, and a junction can be formed with the troops from Pittsburgh at almost any point." Grant, the same day, telegraphed Buell: "The enemy at and near Corinth are probably from 60,000 to 80,000."

At the very time of these various interchanges of opinion Hardee's corps was in line of battle within a mile and a half of Sherman's headquarters, having deployed in this position at 10 A.M., 5 April, with General Bragg's corps forming as a second line, and Polk's and Breckinridge's corps, the rear of Johnston's army, closing up. The Confederate army had marched from Corinth the morning of 3 April, expecting to attack Saturday morning, the 5th, but a heavy storm and other causes delayed so that the attack was postponed till Sunday morning, the 6th. Such was the situation Saturday night in the Union camps. While there was a very general feeling among the pickets and

many subordinate officers that the enemy was near in considerable force, it was discredited by Sherman, and so the usual precautionary orders were not given to medical, ordnance, quartermaster, or commissary officers, or to the troops, and no one had any official intimation that a battle was impending, or knew that Johnston's entire army was close to their front awaiting daylight to attack. There had been some strengthening of pickets, but nothing was done which even the suspected presence of the Confederate army would have called for.

General Prentiss, after the war, in the first public utterance on the question of surprise, said: "In reference to the still general inquiry, 'Was our army surprised at Shiloh?' I can only reply for myself that I had not the slightest idea that a general engagement was to be fought that day." He said further: "We were not prepared on the 6th of April"; but "admonished by the action of the enemy on Friday evening," he had strengthened his pickets.

Gen. Andrew Hickenlooper, later one of the principal officers of the Society of the Army of the Tennessee, an officer of note in Grant's army throughout the war, and a strong friend of Grant and Sherman ever after, commanded a battery in Prentiss' division at Shiloh. In the course of an exhaustive review of the battle he says of the general situation: "There had been no order or system in camping; no relation of one command to another; no defined front or known rear, except an impassable river. There was no common directing head or superior officer beyond the rank of division commander placed on the firing line, whom all would recognize and promptly obey." . . . "The night before had been passed by the Union troops in merry-making until the camp sank into a peaceful slumber, from which they were aroused by the roar of musketry and the booming of the guns of the Fifth Battery." As to the early hours of the day of battle, he observes: "The bugle's cheery notes aroused the camp at the dawn of day; breakfast was over, and all was ready for an early morning drill, when the faint reports of distant picket-shots were heard and then came the pattering fire of the reserves, . . . followed by volleys on the right that told of swiftly approaching danger." The pickets of Prentiss were the first to encounter the Confederate advance, and being strongly reinforced, they attacked Hardee's oncoming line. The latter pushed rapidly forward and thrust strong flanking forces into the wide gaps on Prentiss' flanks, thus turning both, as well as Sherman's left, and the right of Stuart — Sherman's isolated brigade.

Sherman's brigades formed on their color-line a portion of the troops being called from their breakfast for the purpose. They advanced between 200 and 300 yards, met the enemy in force and checked his advance for a time, Sherman meantime sending to McClernand for a battalion of cavalry to join one of his "for the purpose of discovering the strength and design of the enemy." It was not until 8 o'clock, however, that Sherman became convinced that it was an attack in force. He thus fixes the time in his official report: "About 8 A.M. I saw the glistening bayonets of heavy masses of infantry to our left front in the woods beyond the small stream alluded to, and became satisfied for the first time that the enemy designed a determined attack on our whole camp." At 10 o'clock most of the advanced Union camps were in the hands of the enemy. There had been no time to strike tents or remove stores or private baggage. Sherman relates that two of his horses were killed at the picket-rope, and that he found them still tied there when the camps were recovered the next day.

In spite of this general surprise and of the tremendous onslaught of solidly formed battle-lines, there was throughout the day much stubborn and even remarkable fighting, in which Sherman, Prentiss, McClernand and Hurlbut were personally conspicuous. After the battle began, Sherman's conduct was beyond praise. There were probably 20,000 men in regiments that maintained their shattered organizations, and in broken groups, in batteries, and in mixed forces rallied by brave officers and men, which, together, without special regard to lines, held with desperate courage against the enveloping enemy. Many of them were killed or wounded before the day ended. But nothing could permanently resist the well-ordered Confederate movement. Grant wrote that when he met Buell at the Landing, which was at 1 P.M., "there probably were as many as four or five thousand stragglers lying under cover of the river bluff, panic-stricken, most of whom would have been shot where they lay, without resistance, before they would have taken muskets and marched to the front to protect themselves."

As the day advanced, the Union line was fast disintegrating. Sherman, testifying under oath at a subsequent trial, said that "at least 10,000 ran away." Prentiss' division was surrendered and captured soon after 5 P.M., having fought and maintained its organization to the last, and given the best illustration of pluck, endurance, and persistence in fighting that the history of the first day affords. Sherman's organization was destroyed, and he, with a small force of his own, was fighting stubbornly with McClernand, whose organization, though much broken, was still maintained. About 2 P. M. Johnston was wounded, and died in half an hour. The transfer of command to General Beauregard caused a lull in the fight, and a delay in movement, but at 5 the Union line had been forced back into a corner between the Tennessee River and Snake Creek, an area which included the landing. Here the line presented a front of about a mile and a half to the enemy. Just as an assault on this position was being delivered at the right of the Confederate lines, Ammen's brigade of Nelson's division of Buell's army, which had marched from Savannah through the swamps, was ferried across the river, and two regiments advanced and opened fire upon the right regiments of the enemy, which, in charging forward, had nearly reached the landing. The assault was checked without severe fighting, but the arrival of fresh troops thus became known, and the Confederate attack ended for the day. At this time Grant's line in front of the landing was held by the broken organization of Hurlbut, W. H. L. Wallace, McClernand and Sherman. There were portions of various organizations available within the protected area, and Lew Wallace arrived during the night with 5,000 men. Buell himself had arrived at 1 P. M., and spent the afternoon in learning conditions and studying the ground, and the night in

posting his troops. Nelson's division was ferried over at night, and advanced on the left; Crittenden's, as the steamers brought it from Savannah, was placed on Nelson's right. Two brigades of McCook's division, which followed Crittenden up the river, were established still further to the right. The Union gunboats *Tyler* and *Lexington* anchored off the ravine next above the landing, and near the close of the first day's fight, fired effectively upon the Confederate right flank and front, as the Union line was forced back toward the river. These boats continued their heavy shelling at intervals during the night, to the great discomfiture of the Confederate camps.

The battle of Monday, 7th, was opened under Buell's orders and direction. His left and centre advanced and became engaged with the enemy's pickets immediately after daylight, and encountered their main line at 6 A.M. McCook's two brigades moved at once into action, and were established still further to the right. The Army of the Ohio pressed steadily forward, and at 4 P.M. had possession of the camps of Stuart, Prentiss and a part of McClernand's. Two brigades of T. J. Wood's division arrived as the battle was ending, but only one reached the front. The action closed soon after 4, Buell's forces at that time covering two miles of the battle line (nearly three quarters of it, extending as it did to the left of Lew Wallace's division), and becoming hotly engaged there, in co-operation with Wallace's left regiment. Wallace, at the close of the battle, held the front of the Army of the Tennessee, McClernand, Sherman and Hurlbut being warmly engaged at the close in connection with the left of Wallace, and the right of McCook. About 5 P.M. the Army of the Tennessee reoccupied its former camps.

When Buell first advanced he was joined by Col. J. M. Tuttle of W. H. L Wallace's second division, who gathered up about 1,000 men of his own command, rallied many more from fragments about his bivouac, and without orders proceeded to Buell's lines, reported to him, and fought with him through the day. At daylight Grant gave Sherman orders to advance on the right. He thereupon sent his staff officers to collect his men and moved forward about 7 A.M. At 9 o'clock Hurlbut moved under Grant's orders to support McClernand, who with Sherman, was then engaged near his former camp. Lew Wallace had advanced earlier and held the right of Grant's army. This division finally swung around upon the ground originally occupied by Sherman's camps, there coming in contact with the right of McCook of Buell's line. Here the battle ended.

The division commanders of Grant's army were J. A. McClernand, W. H. L. Wallace, Lew Wallace, S. A. Hurlbut, W. T. Sherman, and B. M. Prentiss. Buell's divisions on the field were A. McD. McCook, William Nelson, Thomas L. Crittenden and T. J. Wood. The division commanders of Johnston's army were: of Polk's corps, C. Clark and B. F. Cheatham; of Bragg's corps, D. Ruggles and J. M. Withers; of Hardee's corps, T. C. Hindman, P. R. Cleburne and S. A. M. Wood; reserve corps, J. C. Breckinridge. The best estimates of strength give Grant 33,000 at the opening of the battle, and Lew Wallace's reinforcement for the second day 5,000. The official reports give Johnston's strength at 39,000 to 40,000. The losses of Grant's army were 1,513 killed, 6,601 wounded and 2,830 missing; total, 10,944. Buell lost 241 killed, 1,807 wounded and 55 missing; total, 2,103. Total Union loss, 13,047. The Confederate loss was 1,723 killed, 8,012 wounded and 959 missing; total, 10,694. Consult 'Official Records' (Vol. X, LII, Part I); Grant, 'Personal Memoirs' (Vol. I); Sherman, 'Memoirs' (Vol. I); Van Horne, 'History of the Army of the Cumberland' (Vol. I); Shiloh Battlefield Commission: 'The 77th Pennsylvania at Shiloh' (Hist. of the Reg. by J. Obreiter) and 'The Battle of Shiloh' (D. W. Reed, Harrisburg 1905); Rich, J. W., 'The Battle of Shiloh' (Iowa City 1911). See also *Bibliography* under CIVIL WAR IN AMERICA.

H. V. BOYNTON,
Late General, U. S. Army.

SHIMODA, shē'mō-dä, or **SIMODA,** Japan, a seaport town on the island of Hondo, at the western entrance of the Gulf of Yeddo, 80 miles southwest of Tokio. It was nearly destroyed by an earthquake and tidal wave in 1854, but was rebuilt, and since 1857, when the Dutch treaty was signed, it has been a free port for foreign commerce. A daily steamer service runs between this port and Tokio in summer. Pop. 5,000.

SHIMONOSEKI, and **MOJI,** shē-mo-no-sĕk'ē, mō'jē, the former originally called Akamagaseki, now popularly known as Bakan: a fortified town, seaport and railway terminus of Japan, at the southwestern extremity of Honshu (the Main Island), situated in 130° 56′ E. long., 33° 57′ 30″ N. lat. on the northern coast of the Shimonoseki Straits. Together with Moji, on the opposite coast, the town holds the key of the western gateway of the Inland Sea The town extends four miles from east to west and has extensive docks where much Japanese and foreign shipping is cleared, though its trade is not so large as that of Moji. Shimonoseki is famous in Japanese history for the sea-fight in 1185, by which the Taira Clan was exterminated by the Minamoto Clan. Here also took place a bombardment of the forts, 5–8 Sept. 1864, by a united squadron of American, British, French and Dutch warships, which landed marines and seized the batteries The situation arose through the action of the Daimyo of Chōshū (in whose territory the town lay), in attempting to keep foreigners away by repeatedly firing on foreign ships that passed his batteries on the coast. The American steamer *Pembroke* was fired upon 25 June 1863; on 16 July United States steamship *Wyoming* destroyed two vessels and attacked the batteries in retaliation. When the combined squadrons (17 vessels) of the four powers brought the Daimyo to terms, the latter agreed to abstain from future hostilities, and thenceforth to supply foreigners with provisions. The Shogun (Commander-in-chief, a feudal office abolished in 1868) was obliged to pay an indemnity of $3,000,000, of which amount the United States received $785,000. The American government returned this sum to Japan in 1883, but without interest. After the Restoration in 1868 Shimonoseki rose in prosperity owing to its geographical situation. The treaty of peace which ended the Chino-Japanese War of 1894 was signed

here 17 April 1895 (ratified 8 May) by Marquis Ito, Japanese premier, and Li Hung Chang for China. Pop. 92,000.

Moji is usually coupled with Shimonoseki as their interests in shipping are identical. The latter is under the jurisdiction of Yamaguchi, 51 miles away; Moji under that of Fukuoka, 47 miles away. The foreign merchants and shipping agents have their offices on the side best suited to their convenience, but the principal Japanese banks and shipping offices are at Moji. That town became important in 1887 when the Kyúshú Railway made it the terminal. It is entirely open to general foreign trade. Pop. 95,087.

SHIN-PLASTER, a bank-note, especially one of a low denomination; a piece of paper money. The term is derived from an old soldier having used a quantity of worthless paper currency as plasters for a wounded leg. See MONEY, PAPER.

SHINER, one of various small silvery fishes of the family *Cyprinidæ*, found in all streams from New England to Kansas and Louisiana, especially in those choked with weeds. They are the object of childish angling expeditions, and sometimes are large enough to be cooked, but should be eaten at once, as the flesh spoils quickly. (See DACE; MINNOW). The moonfish (*Vomer setipennis*) is sometimes called blunt-nosed shiner.

SHINGLE. A shingle is a flat, tapered piece of wood used as a roof covering or for the siding of houses and bungalows. Dating back to the earliest American settlements, the wooden shingle has been used as a roof covering, and only in comparatively recent years has any other roofing material been used by the people of the United States and Canada. Until the latter part of the 19th century the shingles were cut from the nearest woods at hand that best answered the purpose. The earliest settlers on the Atlantic Coast used principally the wood of the White Pine and the Virginia Cedar. As they were made by hand, such woods were selected as possessed a straight grain, split easily and possessed a considerable degree of durability. In the southern part of United States, Cypress is largely used for shingles.

The rapid development of the United States, however, called for large quantities of wood for other construction purposes, and gradually the supply of woods suitable for the manufacture of shingles became exhausted to such a point that woods of more abundant supply were sought. On the Northwest Pacific Coast was found the Western Red Cedar in practically inexhaustible supply, and it was discovered that this species had been used on the Pacific Coast for shingles since the time of the earliest settlements there.

Development of transcontinental railroads made available shingles sawn from this species over almost the whole of North America and to-day 85 per cent of the shingles manufactured are sawn from this wood. Due to its large use in the manufacture of shingles, Western Red Cedar (*Thuja plicata*) is also commercially known as "shingle wood."

At the present time, California Redwood, Southern Cypress, Eastern White Cedar and the Western Red Cedar constitute about 99 per cent of the supply for wooden shingles, but the latter is by far the best known, and most widely used.

On the warm moist slope of the Cascade Mountain Range in Washington, Oregon and the Province of British Columbia, the Western Red Cedar tree is found in great abundance, and in this locality it attains its maximum growth and size. Trees of from 12 to 16 feet in diameter, measured 4½ feet from the ground, are not uncommon. Under average growing conditions, when this tree is mature it will have a clear bole of from 50 to 100 feet. No other American wood is better adapted to the requirements of a wooden shingle than Western Red Cedar. The supply is sufficient to meet all demand. It is durable in the extreme. It is quite easily worked. It has an extremely straight-grain. It is light in weight. It has an oil peculiar to this wood alone that renders it quite immune from the ravages of fungi and insects.

The timber is removed from the woods in either log or "bolt" form. At the shingle mill the timber is cut into the length of shingle desired and is then usually barked and cut into blocks small enough to be handled with ease. The resulting blocks are then placed in a shingle machine, which automatically cuts off the tapered shingles. Any defects are then trimmed off and the shingles cut into the most desirable widths. The shingles are then dropped into large bins, from which they are packed. To expedite seasoning and to reduce the weight for transportation purposes, after packing the shingles are put through a dry kiln, where they are dried for from 7 to 10 days, at the end of which time they are ready for shipment.

Formerly cedar shingles were cut in two standard lengths, 16 and 18 inches, and packed in two standard thicknesses. For the 16-inch shingles, these thicknesses were five-to-two and six-to-two, meaning five shingles at their butts would measure two inches, and six shingles at their butts would measure two inches. For the 18-inch shingles, these thicknesses were five to-two-and-one-quarter and five-to-two. Red cedar shingles are now classified under three different grades, Nos. 1, 2, and 3, each of which is manufactured in three different lengths, 16, 18, and 24 inch.

There are many striking examples of long life peculiar to the roofs of homes covered with Red Cedar shingles. "Lowland," the magnificent mansion of the late George Abbot James, at Nahant, Mass., was built and roofed with Red Cedar shingles in 1872 and is found to be in perfect state of preservation. The old Block House built at Fort Borst in 1845 was roofed with Red Cedar "shakes" (split shingles) and is still in an excellent state of preservation. Many of the pioneer homes of the Northwest that were covered with Red Cedar shingles are yet in service.

Logs of Western Red Cedar have been frequently found in the forests of the Pacific Northwest, over which trees have grown, that have been found by counting their annual growth rings to be over 800 years old. In every instance the logs have been found to be in a perfect state of preservation.

Due to the abundance of timber supply, and the comparatively small amount of capital neces-

sary to finance the manufacture of shingles, there have been a very large number of shingle mills constructed. Since 1916 there has been a trend toward the use of other materials than wood which are to a large extent fireproof. These materials include asphalt compositions, asbestos and copper. City building ordinances in many instances require fireproof roofing materials.

SHINGLES, or *herpes zoster,* an acute infectious disease of man characterized by unilateral inflammation of posterior root ganglion or ganglions of cranial nerves. It is manifested by pain and local redness, followed by the appearance of small vesicles arranged in clusters over the distribution of the nerves affected. These vesicles in the skin are at first filled with a clear fluid which later becomes cloudy and often purulent. The cause is a virus that is similar in shape and size to that of varicella. It occurs only in man and is more common in adults than in children and may appear at any season, occasionally in epidemic form. If it is at all infectious this is only in the early stage of the primary form. Secondary types occur in the course of such diseases as spinal cord tumor, tabes, and syphilis and in those who have been overdosed with arsenic or bismuth. The incubation stage is from a few days to several weeks and an attack is preceded by neuralgic pains and tenderness along the skin area supplied by the affected sensory nerves. The eruption is on one side only and about 75 per cent of the cases are found to have the vesicle situated on levels between the second dorsal and the second lumbar vertebrae. The eruption spreads to new areas as the old ones begin to dry up and heal. Occasionally there is intense pain with deep seated ulceration followed by the formation of scars. Involvement of the fifth cranial nerve is next in frequency, the ophthalmic branch being involved, with pain, excessive flow of tears, intolerance to light and occasionally corneal ulcers. The eruption is seen above the eyebrow. Diagnosis of *herpes zoster* in early stages is sometimes difficult but when attended by the characteristic eruption it becomes evident. Treatment is generally symptomatic. In elderly people who suffer severely sedatives are indicated and opiates are used occasionally. Ointments containing cocaine are seldom helpful. Deep X-ray therapy may be advisable and in the occasional case nerve block or nerve section may be indicated. Complications are unusual except in corneal involvement where vision may become impaired. See also HERPES.

HAROLD WELLINGTON JONES, M.D.

SHINN, Everett, American artist: b. Woodstown, N. J., Nov. 6, 1873. He studied at the Philadelphia Academy of Fine Arts and in Paris. He is known for his pastels and mural decorations, and as a magazine illustrator. He painted the mural decorations at the Belasco and Stuyvesant theaters, New York, and at Trenton City Hall.

SHINN, Florence Scovel, American illustrator, wife of E. Shinn (q.v.), to whom she was married in 1898: b. Camden, N. J., late 19th century. She studied at the Pennsylvania Academy of Fine Arts, and became well known for her book illustrations, which include *Mrs. Wiggs of the Cabbage Patch, Lovey Mary,* and *Coniston.*

SHINNECOCK BAY, shĭn'ē-kŏk, an inlet, indenting the southeastern shore of Long Island west of Southampton. It is about 12 miles long and its maximum width is about two and a half miles.

SHINNECOCK HILLS, low hilly region, Long Island, in Suffolk County between Great Peconic Bay and Shinnecock Bay, 4 miles west of Southampton. The Shinnecock Indian reservation is here.

SHINNECOCK INDIANS, an Algonquian tribe of Long Island, N. Y., formerly occupying the southern coast from Shinnecock Bay to Montauk peninsula. Many of them early joined the Brotherton Indians, and the few that remain live on their reservation of about 400 acres, 4 miles west of Southampton.

Consult Hodge, F. W. (ed.), *Handbook of American Indians,* 2 vols. (1907–10); Harrington, M. R., *Ancient Village Site of the Shinnecock Indians* (New York 1925).

SHINTO, shĭn'tō (spirit-way), the primitive folk-faith of the Japanese, was a typical barbarian religion composed of nature-worship and ancestor- (including hero) worship. Chinese culture, filtering into Japan through Korea, brought with it Confucianism about the 4th century A.D., and Buddhism in the 6th; and these two made with Shinto a religious compound in Japan similar to that which they made with Taoism (see TAOISM) in China, except that Shinto was nearly absorbed by Buddhism, until its resuscitation, from the 18th century onwards. This culminated in its reinstatement in pure form as state religion at the Japanese revolution in 1868, only, however, some years later to be disestablished and declared not a religion, but a state ceremony. Under the influence of modern education, its cult is rapidly declining. This immigrant Chinese culture also made possible commitment to writing of the Shinto myths and legends, 712 A.D., into the Kojiki, "Ancient Records," and of the Shinto rituals, 927 A.D., into the Yengishiki, "Ceremonial Law"; recording their barbarian traits in a naive, unexpurgated form which aptly exemplifies the rise of religion in both creed and cult.

The Japanese theory of origins begins its myths with Izanagi, "Male who Invites," and Izanami, "Female who Invites," a primitive pair that still survive in popular belief. Their begetting of the various islands of Japan—which, as the commentators of old Japan used to explain, have since grown enormously—was performed with the aid of phallic rites (see PHALLICISM) which persisted in Japan until the revolution in 1868. After the decease of his sister-wife, Izanagi produced several deities in various magical ways, and especially three great deities: Amaterasu (Sun) from his left eye, Tsuki-Yomi (Moon) from his right eye, and Susano (Storm-cloud) from his nose, with obvious implication of Izanagi as creative Heaven. Amaterasu-O-Mi-Kami, "Heaven Shines Great August Deity," has always stood supreme, as sun goddess, among the myriad deities of Shinto, and is still worshipped at innumerable shrines throughout Japan. Susano, "Impetuous Male," represents the storm-cloud, now in turbulent strife with his gentle sister, Amaterasu, now quelling destructive fires for man. His rule over Izumo province descends

through six generations to O-Kuni-Nushi, a moon-god who with his son, Koto-Shiro-Nushi, are now popular as gods of wealth, under the names of Daikoku and Ebisu. The former is seated on rice bales, the latter holds a fish, these being the staple foods in Japan.

In accordance with the evolution of religion, the Kojiki now passes from the origin of its gods in myth to the origin of its rulers and priests in legend, and of course secures authority for the latter by derivation of them from the former. Thus the Kojiki relates how Amaterasu produced by magic a son, Ho-Mimi, whose begotten son, Ninigi, at her command, descended from Heaven with a retinue of nobles and priests, deposed O-Kuni-Nushi, and founded that Imperial Dynasty which still after two millennia rules in Japan, "in lineal succession unbroken for ages eternal." The Imperial Oath, prefaced to the Constitution of Japan, promulgated in 1890, appeals to the "Imperial Founder of our House," namely, Jimmu Tenno, greatgrandson of Ninigi, who was in turn supposititious "sovereign grandchild" of Amaterasu-O-Mi-Kami. The "Heaven" from which Ninigi, with his nobles and priests, really descended was Korea, as the Kojiki naively implies and as certain monuments show.

After his abdication and dealth, O-Kuni-Nushi became (according to his Kyushu conqueror) as "Great Deity of Miwa," ruler of the "invisible," by which was meant the world of thought and secret action which escapes the notice of the earthly ruler. The tutelary gods of every province must report at O-Kuni-Nushi's shrine in Izumo every October (hence called everywhere except in Izumo the "godless month") upon the condition of each individual's soul. O-Kuni-Nushi then punishes or rewards by means of the natural good and evil that befall men. Later he became a ruler of the dead. The mythical element in the Kojiki now decreases and legend passes into annals which close in the 5th century A.D.

The ancestor and hero worship of Shinto was absorbed by Buddhism, since the latter professed especial knowledge about the future life; though each district managed to retain an Ujigami, Clan god, to whom infants were presented for adoption and naming. Hero worship is maintained mostly in these Ryobu, "Two Faced," shrines. Such were Tenjin-Sama, "Heaven Spirit Lord," originally the minister of state and scholar, Michizane of the 10th century A.D.; Hachiman San, an apotheosis of the Emperor Ojin of the 4th century A.D., as God of War; Ieyasu and Iyemitsu, 17th century shoguns of Japan, with gorgeous temples at Nikko; and Motoori, a patriotic scholar apotheosized during the last reign. Until the revolution in 1868 two *living* persons were regularly treated as divine; the Mikado still styled Tenshi Sama, "Heaven Son Lord," descendant of Amaterasu-O-Mi-Kami; and the high-priest of the Izumo O Yashiro, being the 76th generation from O-Kuni-Nushi, and until 1868 styled Iki-gami, "Living-god."

The Yengishiki, "Ceremonial Law," compiled 927 A.D., from much older sources, is a worthy companion to the Kojiki. It contains 27 rituals, which consist, not of free petitions, but of statements of the *grounds* upon which the offerings, which are the essential thing, are made, namely the reception of some natural good. The famous Obarsi, performed for the whole nation June 30 and December 31, affords a single exception to this quest for natural good. The Kagura is a popular occasional ceremony, a peace offering of food, music and dancing made to any deity by the temple attendants—usually the daughters of the resident priest—at the request and expense of any worshipper. The priests marry, their office is hereditary, but may at any time be abandoned, and distinctive dress is worn only when they are officiating. They make no claims to personal sanctity or authority.

The infrequent preaching of the priests always appeals to the examples of the gods, and for positive rules to the laws of that Tenshi Sama who rules by divine right. As for the rest of conduct, "Human beings, having been produced by the spirit of the two Creative Deities, are naturally endowed with knowledge of what they ought to do and what they ought to refrain from. It is unnecessary for them to trouble their heads with systems of morality."—N. Matoori. The Kurozumi, a sect founded a century ago, and now having about a million adherents, practises mental healing by various rites, and by accord with two commandments: Thou shalt not be without a constantly believing heart. Thou shalt not yield to anger nor grief.

SHIP. A ship is a large vessel intended for navigating the ocean. Technically a ship is a vessel carrying not fewer than three masts rigged with square sails. In the present day ships are of two kinds, steam or motor (Diesel propelled), sail having vanished. For a history of wind ships see the article SAILING VESSELS, and for a historical sketch of steamships, see the article STEAM VESSELS. A detailed description of vessels used in naval warfare will be found under the title WARSHIPS.

A ship has three principal dimensions: length, beam, and depth. Two lengths are commonly referred to, namely: length, overall, and length between perpendiculars. Length, overall, is the straight-line horizontal distance between the extreme ends of the ship; length between perpendiculars is the straight-line horizontal distance between the forward side of the stem and the after side of the rudder post at the ship's designed load waterline, through which points the designer erects perpendiculars from the base line when laying out the line drawing. The beam is the maximum width of the ship measured at right angles to the length. Beam, molded, is the maximum width of the ship, less the thickness of the plating on both sides. Depth, molded, is the distance from the top of the keel plate to the underside of the upper-deck plating at mid-length. That part of the depth of a ship below the water-level is called the draft; that part above the water-level is termed the freeboard. The draft and freeboard vary according to the weight of cargo carried, the draft being more and the freeboard less when the weight is greater.

The principal requirements of a ship are buoyancy, stability, strength, capacity, and speed. The buoyancy of a vessel depends upon its ability to displace a greater weight of water than the weight of the materials of which it is built. The weight of water (in tons) thus displaced is called the displacement of the ship; and, as salt water is heavier bulk for bulk than fresh water, with the same load a ship will ride higher in salt water than in fresh. The center of buoyancy is equivalent to the center of gravity of the mass of water displaced by the ship. When the ship is at rest

in placid water it is located at a point in the vertical line passing through the center of gravity of the ship. It is the point at which the pressure of the water in which the ship floats is theoretically centered—as the *force* of buoyancy. This force, however, acts not at the center of buoyancy, but vertically upward through that center. As the ship rolls under the action of waves or of wind the center of buoyancy shifts. In Fig. 1, the continuous lines show a sectional diagram (amidships) of the vessel at rest in placid water: the dotted lines show the vessel heeled over by wind and wave. The center of buoyancy has swung from B to B′; the center of gravity moves to G′. XB′ shows the line of the force of buoyancy, and G′Z the length of the arm of the righting moment (product of buoyant force and arm) tending to right the ship to an even keel. Stability is that quality of a ship by virtue of which it resists overturning. The nearer the center of gravity of the ship can be brought down (in the loading) to the center of buoyancy, the more stable the ship—that is, the greater the force which must be applied to raise the center of buoyancy above the center of gravity and cause an overthrow. In other words the stability of a ship depends upon the relative positions of the

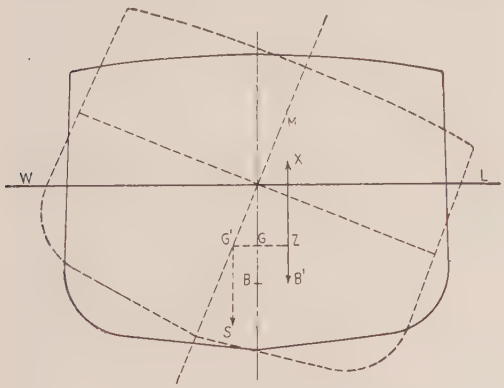

Fig. 1.

center of gravity and the center of buoyancy. The center of gravity is discovered by a calculation of the various weights making up the ship's total displacement. Another series of calculations based on the form, or proposed form of the ship, will determine the position of the center of buoyancy. A graphic method of determining the position of the center of buoyancy consists of cutting from cardboard a series of equally spaced cross-sections of the ship drawn to scale and gluing them together with their center lines and load-water lines matching as in Fig. 2. Several groups of these cross-sections are made, one for each angle of rolling. Equidistant parallel lines are drawn across each model, representing the position of the vessel with different loadings. The divisions are cut off in succession from the top line, and the remainder after each cutting is carefully weighed and recorded for purposes of comparison. Before each cutting the combination of cross-sections is suspended from a nail, allowing it to hang freely, and a plumbline hung from the same point of support. The model is hung first from one corner and then from the other—as shown in Fig. 3, where PL represents the plumbline in the first suspension, QR, the position of the plumbline in the second suspension, and B, the center of buoyancy found by their intersection. From B a line is projected vertically upward—that is at right angles to the waterline to which the ship is assumed to roll. The extension of that line until it meets the center line GK of the ship's molded form gives the point M, known as the metacenter. In discussing the principles of flotation, the ship is often considered a pendulum whose point of suspension is at the metacenter. The higher this point is above the center of gravity (G), the more stable the ship. As M is made by the ship's form or the loading to approach G, stability diminishes,

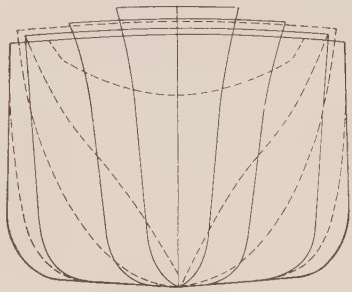

Fig. 2.

and when M passes below G the equilibrium is unstable, and overturning is imminent. The horizontal distance (GZ) from the center of gravity to the vertical line passing through the center of buoyancy and the metacenter represents the arm of the moment operating to right the vessel; that is, when the lines of the model are drawn to a standard scale.

Finding the center of gravity is a much more complicated process. The necessary calculations are too extended to be reproduced here and the reader is referred to technical works on naval architecture for study of the problem. A mechanical method is often employed and when ex-

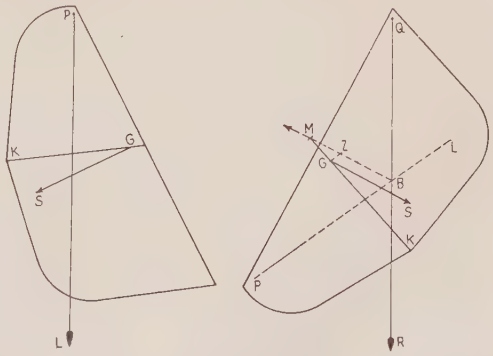

Fig. 3.

treme care is exercised the results are sufficiently accurate to serve every practical purpose. The "light" ship—that is, with no fuel, stores, or cargo on board—is subjected to what is known as an "inclining experiment." The ship is heeled over from an upright position by the moving of a weight from one side to the other. The trial must be made in perfectly calm weather, in placid water, and the weight should be large enough to roll the vessel through an arc of at least two degrees. For a vessel with a 70-foot beam a weight of 10 tons is required. Large concrete blocks are commonly used. A long plumbline is suspended inside of the ship and its deflection is

measured after each movement of the inclining weight. Knowing the length of the plumbline, the weight of the inclining block, the distance each weight was moved, and the deflection of the plumbline, and having previously calculated the position of the metacenter, M, the distance GM is then found by routine calculations and the position of center of gravity, G, is then known.

Trim, as applied to a ship, is allied to its stability. The term signifies the condition of draft as related to length. For example, if the draft forward is one foot less than the draft aft, the vessel is said to have a trim of one foot by the stern. A trim by the head would mean that the draft forward was the deeper.

Strength of structure is necessary to withstand the stresses to which the ship is subjected by wind and waves. In order to calculate these stresses the vessel is regarded as a girder supporting the various weights of cargo, engines, fuel, etc., acting downward; and also acted upon by the force of buoyancy acting upward. This girder is studied in two situations: First, as lying across the trough between two waves, supported at each end by deep water with its large lifting stress and by shallow water with very little supporting power at the middle; this is called the "sagging" stress. The other critical position is that where the middle of the ship's length is supported by the deep water of the crest of a wave and both

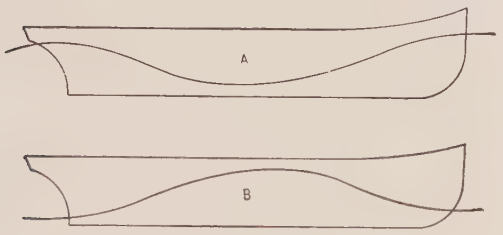

Fig. 4.

ends are in troughs; this is called the "hogging" stress. These two conditions are illustrated at A and B respectively in Fig. 4. The strength of the ship proper is thus quite distinct in meaning from the local strength of various parts designed for certain purposes, as for the distribution of the weight of the engines, the thrust of the propeller, the supports for hoisting cranes, and the like.

The capacity of a ship is her ability to carry stores and cargo, together with crew and passengers. The greater this capacity is in proportion to the size, and the greater the speed of the vessel, the greater is her utility. The more lightly a vessel is built the greater will be her capacity for her size; but the lightness of a vessel is limited by the need of strength to resist stress. Capacity is also to some extent dependent on form, and the form which is most conducive to high speed is not necessarily that which gives the greatest capacity for stowage. The speed and the maneuverability of a vessel depend on her underwater form.

Given equal propelling power, length, beam, and draft, the ship with the finer underwater form will have the less resistance and, hence, will be faster. Long hollow (concave) lines forward and aft are faster than short full (convex) bows and sterns. Hull resistance may be divided into frictional and residual. The frictional resistance is that caused by the water passing over the underwater surface (wetted surface) of the ship. At low speeds, frictional resistance is predominant. Since frictional resistance is proportional to wetted surface, the less underwater surface, the less resistance. A fine shape has less wetted surface than a full one. Residual resistance is that caused by the eddies and waves which the ship makes as it passes through the water. Eddies and waves require energy to create. The energy which creates the waves and eddies associated with the passage of a ship through the water comes from the ship's power plant. That energy is wasted instead of being transformed into propulsive effort. Negligible at low speeds, residual resistance builds up rapidly as speed is increased. Eddy-making is largely dependent on the shape of the stern. The finer the stern, the less eddying or turbulence in the wake of the ship and, hence, the less resistance. Wave making, in turn, is dependent mainly on the shape of the bow. At a given speed a fine bow will have a smaller wave-making tendency than a blunt one and its resistance, therefore, will be lower.

Ship Design.—As the first step in the building of a ship is the designing of it, the use to which it is to be put must first be decided on. What cargo is it to carry and how much? And what speed is desired? The answer to these questions will go far in determining the ship's dimensions—length, beam and depth—and to a large extent the shape or "lines" of the underwater body and the horsepower of its propelling machinery. The available depth of water in the harbors the ship is designed to visit is another controlling factor.

As the dimensions of the ship are not known, a trial design is first calculated upon the basis of the tonnage required; say, for example, 10,850 deadweight tons. The designer makes a calculation of a hull which will afford the space for 10,850 deadweight tons. Besides cargo, the weight of the necessary fuel, freshwater, and stores is included in the desired deadweight tonnage. The displacement of the completed ship will be the deadweight tonnage plus the weight of the ship itself (light displacement). From experience and experiment with the type in question it has been found that about 41–100ths of the whole carrying capacity (including fuel, stores, etc.) must be added for the vessel itself. The ship carrying 10,850 tons will, therefore, have a displacement of about 15,300 tons. It devolves then upon the designer to determine length, beam, and depth for his vessel from this total displacement. Into this problem enters first, if at all, the available depth of water in the harbors where the ship will trade. The shallower the possible draft, the greater, relatively, the beam. Aside from this the desired speed determines the proportion of length to breadth. The longer the ship—and the narrower—the speedier she will move for the same engine power. A trim underwater body with long gently flowing curves will require less horsepower for a given speed than a body which is full and roomy well up to the bow and back to the stern.

For all of the calculations "constants" and "coefficients" are available to the designer, and his ship of 15,300 tons will, in ordinary course, figure out a length of between 450 and 460 feet and a beam of 58 to 62 feet, a draft of 28 to 30 feet, with a total depth of about 40 feet. With engines of 8,000 horsepower this vessel should show a speed of about 17 knots.

In the planning of the ship, the established rules of the American Bureau of Shipping or

some other classification society must be strictly adhered to in order that the vessel may be insured.

After the naval architect has established the principal dimensions, hull form, and general arrangement of the ship, he is confronted with the problem of designing a structure, generally of steel, sufficiently strong to meet the needs of the service in which the vessel will be engaged. It is at this point that the construction rules of a classification society are consulted. Based on a vast background of experience, they enable the designer to select proper sizes of structural members without spending excessive time in making trial calculations. From these rules a structural drawing of the midship section is developed. This drawing is, in effect, the master plan for the structure of the ship, the sizes of the hull members at various distances forward and aft being related by the rules to the sizes or scantlings

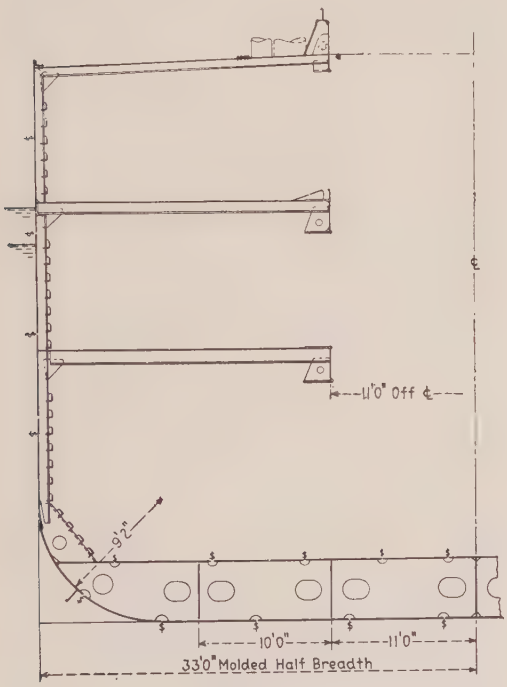

Fig. 5.

amidships. Lest it be thought that classification society rules have a stultifying effect on structural design, it is emphasized that these rules are constantly being studied in the light of new developments, and that they serve as examples of successful practice against which departures from custom can be compared and evaluated. The rules were developed to serve as standards for judging whether or not a ship can prudently be insured. Actually the rules offer the designer a wide latitude for the exercise of ingenuity in providing a structure which will meet their basic strength requirements.

A simplified midship section of a transversely framed, modern, all-welded dry-cargo ship is shown in Fig. 5. The actual drawing developed by the naval architect shows a mass of detail and is encumbered by numerous notes which will be followed in the development of the other structural plans.

The locations of the strakes of plating amidships, along with their sizes, appear on the midships drawing. Development of plans showing the disposition of plating throughout the hull require a three dimensional study which is most conveniently carried out by making a half model or a model of one side of the ship, and drawing the outlines of the strakes of plating thereon. Dimensions can then be measured on the model and the several plating drawings can be developed therefrom. Fig. 6 shows the strakes of plating laid out on a body plan.

The hull of the ship derives most of its strength from the shell and deck plating. All other parts of the ship, that is, the framing, can be considered as practically the support and stiffening of the plating. In a large vessel the pressure of the water upon its exterior shell is high, the tendency being to cause collapse. This pressure is increased by the violent blows of waves, and from the pitching and rolling sustained in rough water. Herein lies the demand for the knowledge of the skilled engineer, that the metal of which the ship is constructed shall be so disposed as to afford abundant strength and resistance to every possible stress and strain

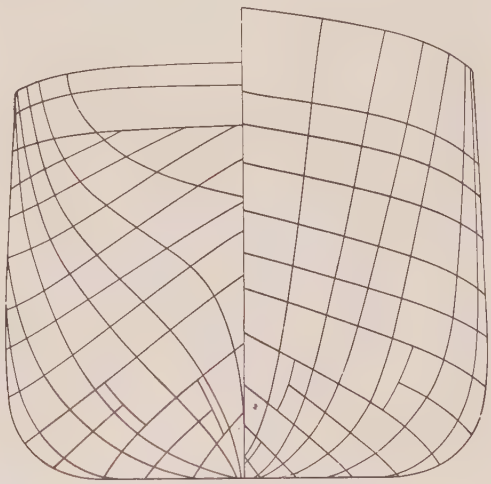

Fig. 6

from without. Another series of stresses arises from the load carried by the vessel, and acting from within, of great magnitude when the waves are high and the ship is subjected to a hogging stress when lying across the crest of a wave, or to a sagging stress when lying across the trough between two waves. It is customary to regard the ship's structure as a beam so far as the amidship's part is concerned. The ends of the vessel from their wedge-shaped construction are from that condition relatively stronger and may safely be more lightly built. The art of the shipbuilder is in the skillful adjustment of material to its purpose, so disposing it as to afford abundant strength, without interfering with generous cargo capacity.

There are two basic methods of reinforcing the shell plating of a ship, namely: the transverse system and the longitudinal system. In the transverse system, closely spaced frames, made of steel channels or angles, are set up in planes perpendicular to the vertical centerline plane of the ship. Extending from the upper deck to the double bottom, they are attached to the side plating either by rivets or welds, and to the deck

beams and double bottom by plate brackets. While transverse frames do not contribute to the longitudinal strength of the ship, leaving this work to be accomplished by the shell and deck plating, they do resist transverse buckling and present smaller protrusions into the cargo-carrying space or holds of the ship. Hence, the transverse system is favored for dry-cargo ships.

The longitudinal system of framing employs deep plate frames or stringers running lengthwise along the shell, supported at wide intervals by deep transverse frames called web frames. Since the longitudinal frames resist longitudinal stresses, the thickness of deck and shell plates may be decreased in a vessel so framed with the result that the hull structure is lighter. At the same time, longitudinal frames resist transverse buckling. Oil tankers, whose cargo conveniently stows itself around the deeper inboard protrusions of the longitudinal frames, usually employ this system of framing.

Actually each system employs some of the features of the other because a few longitudinal stringers are employed with transverse framing, and a few transverse frames are employed with longitudinal framing. Where both systems are extensively employed at the same time, a cellular framing effect is produced which possesses great strength and is often found in warship structures.

No matter what system of framing is used, transverse bulkheads are installed as main strength members, as well as a means of subdividing the hull into compartments. As strength members, the transverse bulkheads, which are walls of steel plate, stiffened by steel angles or channels, are erected perpendicular to the keel and extend from side to side; they resist transverse buckling, support the decks, and serve as a means of anchoring longitudinal frames and stringers in position. These bulkheads are made water-tight to prevent flooding of adjacent compartments if one compartment is stove in.

The extensive use of welding in modern steel shipbuilding permits the designer to create a much lighter and stronger hull than was permitted by riveted construction. The flanges and laps required to fasten frames to plates or plates to plates with rivets are eliminated by welding, thus decreasing the weight, and the welded joints are stronger than those joined by rivets. Since there is a certain amount of play or slip in riveted joints, they are still employed in large vessels where the designer fears that welding will make the hull too stiff to withstand the constant bending it undergoes in a seaway. Thus, in a large welded tanker, the seam of the plating just above the turn of the bilge and the attachment of the uppermost strake of plating to the angle forming the corner of the deck and side shell will be riveted to permit the vessel to bend or work freely. Besides saving weight, welding also offers considerable saving of time during construction.

To save weight, the designer has turned to the use of aluminum and high-tensile-strength steels for the construction of superstructures. Aluminum alloys have been developed which withstand the corrosive action of salt spray and they permit much lighter superstructures than does the mild steel employed in the hull itself. Designers look forward to the day when it will be economically practicable to construct all-aluminum hulls for ocean-going vessels. Being stronger than mild steel, thinner plates can be employed in a deck house built of high-tensile steel.

The division of the hull into watertight compartments is a feature of present shipbuilding regarded as indispensable, particularly as regards the "collision bulkhead," placed near the bow, to keep out the sea in case the bow is broken by collision. The requirements of the International Convention for the Safety of Life at Sea are that the compartments shall be of such a size that the vessel may still float safely if two of them are breached. This provision demands at least eight transverse bulkheads in the ordinary passenger liner. The compartments are connected by watertight sliding doors which are operated from the bridge, in case of emergency.

Given the hull, the remaining problem is its propulsion. A certain model of hull will be found to have a definite economic speed. Above this speed the engines labor without corresponding effect. This economic speed can be calculated very closely by the shipbuilder from the under-water lines of his design and checked by towing a model in a towing tank. He is thus able to decide upon the size of the propeller or propellers needed—their diameter and pitch, and the number of revolutions they must make per minute to drive the ship at the desired rate.

Engines powerful enough to turn the propeller at the desired number of revolutions per minute may then be designed or selected. There are three main types of propulsion machinery from which the designer may choose, namely, reciprocating steam engines, steam turbines, or Diesel engines. The reciprocating steam engine, with the exception of the Unaflow type, was thought to be a thing of the past, at least in the United States, until the advent of World War II, when it developed that they were the only engines which could be built in time to meet the needs of the Liberty-ship program. Although reliable, and comparatively easy to build and operate, the modern triple-expansion reciprocating steam engine consumes an inordinate amount of fuel per horsepower-hour compared to other prime movers. For this reason, from the commercial operator's viewpoint, the Liberty ships were obsolete before they were built.

The Unaflow reciprocating steam engine has remained competitive with the Diesel engine in the 1,500–5,000 horsepower range, its higher fuel consumption being offset by simplicity of operation and low maintenance costs.

For ocean-going vessels the designer usually finds himself confronted with a choice of steam-turbine or Diesel machinery. Much has been said about the relative merits of turbines and Diesels. The Diesel engine, which is a close cousin to the gasoline engine, requires no boilers and consumes about 40 per cent less fuel per horsepower-hour than the turbine. The boilers which supply steam to the turbine, on the other hand, burn a cheaper, less refined grade of fuel oil. Considerations of weight, space required, and maintenance costs also enter the picture. Faced in 1950 with the need of repowering two old sister ships, an important American ship-operating firm decided to try to settle the issue to its own satisfaction by replacing the engine of one with a steam-turbine installation and the engine of the other with a Diesel power plant. Set up as a controlled experiment, the data obtained over a period of years should produce some conclusive evidence as to which is best in that operator's particular service. This experiment is mentioned merely to show that the ques-

tion, at least in the United States, lacked a conclusive answer five years after the end of the second World War.

In the United States almost all new ocean-going ships are turbine driven. The majority of new European ships employ Diesel engines. The Diesel engine, however, has all but eliminated other prime movers for propelling new American workboats such as tugs, towboats, ferryboats and fishing craft.

Oil is the accepted fuel for new ships, even in regions like the Great Lakes which have easy access to an abundant supply of coal. Should the energy released by atomic fission prove a practicable source of power for marine machinery, it is anticipated that it will first be used to generate steam to drive a turbine.

Having selected an engine or turbine with sufficient power to drive his vessel, the designer is confronted with the problem of transmitting its power to the propeller so that both engine and propeller will revolve at their most efficient number of revolutions per minute. The engine will be most efficient at one rotative speed, the propeller at another.

Propellers operate most efficiently at a comparatively low number of revolutions per minute. Some prime movers, such as turbines and high-speed Diesel engines, are most efficient at comparatively high rotative speeds. When such machinery is installed, it is connected to the propeller shaft either through reduction gears or electric transmission (high-speed prime mover turns an electric generator which supplies electric current to a low-speed electric motor directly coupled to the propeller shaft) which permit both prime mover and propeller to operate at their most efficient rotative speeds. Some prime movers, such as reciprocating steam engines and the heavy, slow-speed Diesels, have rotative speeds which are in the range of efficient propeller speeds, and, hence, can be coupled directly to a propeller shaft without sacrifice to either propeller or engine efficiency.

Tonnage.—There are four types of tonnage measurements commonly encountered when ships are under discussion. Displacement tonnage and deadweight tonnage are measurements of weight, the ton here being the long ton, equivalent to 2,240 pounds, while gross tonnage and net tonnage are measurements of the cubic capacity of the ship, the ton in this case being equivalent to a space of 100 cubic feet. Displacement tonnage is the weight of water, in long tons, displaced by the ship. It is the same as the weight of ship plus the weight of everything in the ship. Knowledge of the displacement of ships at their designed load waterlines is the most satisfactory means of comparing them for size.

Deadweight tonnage represents the weight-carrying ability of the ship. It is the weight of cargo, fuel, fresh water and stores which will bring the light ship down to her designed load waterline.

Gross tonnage is the cubic capacity of the ship, including that of hull and superstructure with the exception of certain spaces such as the pilot house, galleys, and companionways. Net tonnage is that which remains after the cubic tonnage of such spaces as engine rooms, ballast tanks, and crew's quarters are deducted from the gross tonnage. It is a measure of the space available for carrying passengers and cargo.

Modern Ships.—The modern passenger liner, offering appointments equal to those of the finest hotels ashore, is an engineering masterpiece designed to drive through ocean waves at speeds varying between 20 and 35 knots. It is a combination of grace and strength, reflecting the accomplishments of many arts and sciences. Valuable as naval auxiliaries, many liners are designed for quick conversion to troopships in time of war.

The largest ships in service in 1951 were the Cunard-White Star superliners, *Queen Elizabeth* and *Queen Mary*. In that year a third superliner, *United States,* somewhat smaller than the Queens, was floated out of her building berth at the yard of the Newport News Shipbuilding and Dry Dock Company, Newport News, Va., and was scheduled to enter the United States Lines Company's transatlantic service in 1952.

The *Queen Elizabeth,* the larger and newer of the Queens, completed as a troopship in 1940, is 1,029 feet long, overall, has a beam of 118 feet 6 inches, and a draft of 39½ feet. Capable of accommodating 2,283 passengers, 823 first class, 662 cabin class and 798 tourist, she is propelled by steam turbines geared to four propeller shafts. Although details of her maximum power output have not been published, she is reported to deliver 160,000 shaft horsepower when cruising at 28½ knots. She measures 83,673 gross tons.

Few reliable details have been published concerning the new *United States.* When completed she will be the largest vessel built in the United States. Driven by geared turbines turning four five-bladed propellers, she is reported to be 990 feet long, overall, with a beam of 108 feet. Her prospective owners and the firm which designed her chose to keep her principal characteristics a mystery.

Among the newer passenger liners may be mentioned the Cunard-White Star vessels *Mauretania* and *Caronia,* the former a vessel 772 feet long, delivered in 1938, and the latter, 715 feet long, which entered service in 1949. Both have steam-turbine propulsion plants and are engaged in the transatlantic trade, but the latter sees service as a cruise ship during the slack season on the North Atlantic.

First-class American entries in the transatlantic passenger service include the *America,* a ship 723 feet long, employing geared turbines with a normal output of 34,000 shaft horsepower, enough to drive her at 23 knots, which entered service in 1940, and the American Export Lines' new twins, *Independence* and *Constitution,* which made their debuts in 1951. Anyone familiar with high-class passenger liners, will, upon inspecting these three ships, leave them with the knowledge that their appointments, construction, and machinery are every bit as good, if not better, than those built by other nations.

As indicative of the equipment of a modern steamship, the following brief description of the *Independence,* launched at the Bethlehem Steel Company's Quincy, Mass., shipyard in 1950, and designed for service between New York and Mediterranean ports, may be of interest. She is the first transatlantic luxury liner to have not only all passenger accommodations but also the entire quarters for officers and crew completely air conditioned. Her trial speed of more than 26 knots gives her the distinction of being the fastest American merchant vessel completed up to 1951. At her normal cruising speed of 22½ knots, she will arrive at Naples from New York in eight days.

Independence is 682½ feet long, has an 89-foot beam, and displaces 30,090 tons at her designed draft of 30 feet. Her depth, molded, to the promenade deck, amidships, is 70 feet 10 inches. This vessel has a gross tonnage of 29,496, a net tonnage of 11,166, and, at her 30-foot draft, lifts a deadweight of 12,309 tons.

In all, there are ten decks; the lowest two of these are discontinued amidships to provide space for the machinery and some fuel and water tanks. Fourteen principal watertight or oil-tight transverse bulkheads divide the hull into 15 major compartments. The two complete engine and boiler rooms are separated by a watertight auxiliary machinery compartment, thus eliminating the possibility of flooding both engine rooms by the penetration of one bulkhead.

Her geared steam turbines deliver a total of 37,000 horsepower to the two propeller shafts at the vessel's normal cruising speed of 22½ knots, but they are capable of a continuous output of 55,000 horsepower. At 22½ knots she has a cruising range of 19,000 nautical miles.

The four watertube boilers in the *Independence,* at normal cruising speed, each supply 77,500 pounds of steam per hour to the turbines at a pressure of 627 pounds per square inch and a temperature of 840°F. Exhaust steam from the two sets of turbines is condensed in horizontal, single-pass condensers producing a vacuum of 28½ inches of mercury at normal power when supplied with 75°F. seawater at the rate of 34,000 gallons per minute.

The main-reduction gear sets incorporate the largest low-speed gears manufactured in America, measuring 174.7 inches on their pitch diameters and weighing 63,000 pounds each.

Electrical power on the *Independence* is produced by four 1,100-kilowatt turbine-driven generator sets. The electrical load of the lighting system alone is 750 kilowatts and the all-electric galleys require 500 kilowatts. The vast majority of the vessel's auxiliary machinery and equipment is driven by electric motors.

Twenty-eight large central-station type air-conditioning systems control the temperature and humidity in all passenger and crew spaces. These spaces encompass a volume of about 1,040,000 cubic feet and are supplied with 195,000 cubic feet of conditioned air per minute.

Accommodations have been provided for a total of 1,003 passengers in first, cabin, and tourist classes. Three hundred and fifty staterooms and 21 public rooms are located on eight decks serviced by six main staircases, four passenger elevators and three service elevators. Areas provided for passengers' service include two hospitals, two galleys, five deck pantries, a soda fountain, three bars, a laundry, and tailor, photo, gift, barber, and beauty shops.

Manned by a crew of 577 officers and men, the *Independence* was built at a cost exceeding $28,000,000.

Most medium-sized passenger ships built in Europe are propelled by Diesel engines. Notable among the newer motorships are the Union Castle Mail Steamship Company's 703-foot *Capetown Castle,* operating between Britain and South Africa, and powered by two sets of 10-cylinder double-acting two-cycle Diesels which deliver a total of 26,000 horsepower; the Swedish-American Line's 503-foot *Stockholm,* whose engines put out a total of 14,600 horsepower on its transatlantic runs; and the Royal Rotterdam Lloyd Line's *Willem Ruys,* a 30,500-horsepower, 580-footer designed for the run from Holland to the Far East.

Dry-cargo vessels and tankers compose the vast majority of the ships which ply the oceans in the service of commerce. The trend, today, is to larger and faster vessels in these classes. Whereas America's 525-foot, 12,910-deadweight-ton Mariner-class vessels, laid down in 1951, were about the same size as the largest dry-cargo ships built in the United States during World War II, their 20-knot cruising speed was considerably higher than the 17 knots which their predecessors could make. Their high speed is a military feature which few European-built freighters possess. Since the Mariners represent the latest official American opinion regarding the type of dry-cargo ship best suited for the nation's wartime needs, it is interesting to note that they can carry 2,410 deadweight tons more and have cruising speeds 1½ knots better than that of the *Schuyler Otis Bland,* designed in 1949 as a prototype for an emergency shipbuilding program, and delivered in 1951.

It can truly be said that America has pointed the way to larger tankers. In fact, the tankers which slid off American ways in the late 1940's were so big they were dubbed "supertankers." The 16,700-deadweight-ton tankers built for the United States Maritime Commission during World War II were considered large ships for their type. Shortly after the war, however, American owners placed orders for tankships with deadweight tonnages as high as 30,000, and in 1951 an American firm placed orders with a German yard for two tankers of 40,000 deadweight tons each. A 30,000-deadweight-ton tanker is about 660 feet long, overall, has an 85-foot beam and, when loaded, has a draft of 34 feet. The 40,000 tonners are expected to be over 750 feet in length. Their great size limits the trades in which the "supertankers" can be used, but, since they require no larger a crew than do 16,000-ton ships, they offer considerable economies when they can be used.

Cargo and Ballast.—When the articles in a ship's cargo are heavy and light, the heavier are placed nearest the bottom, to increase the ship's stability. When, however, all are heavy, there may be danger of making a ship too stiff with low stowage; so that, not being balanced, she will snap back to upright after taking a roll, to the discomfort and danger of passengers, crew, and cargo. To obviate this danger some of the cargo should be raised; if steel, some should be stowed between decks; if coal or salt, it may be heaped up in the center, taking care to secure it against shifting, should the ship be knocked down by a sea or squall. Heavy articles should never be placed toward the extremities, lest they promote pitching. The cargo and the ship should be considered as one integral whole, every precaution being taken in loading to preserve the proper relations between the center of gravity and the center of buoyancy. In all cases care must be taken to preserve the trim of the ship—that just proportion between her draft forward and aft which the estimate of the builder, or, when a voyage has been made, experience itself, has determined to be most favorable to speed. See also NAVIGATION; SHIPBUILDING INDUSTRY AND CONSTRUCTION.

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SHIP CANALS. See CANALS.

SHIP IN ART AND SYMBOLISM. As symbol of the state a ship has been used from very distant times; as such it is depicted as steered by its statesmen through the shoals, rocks, and storms of internal troubles, false policies and the machinations of enemy countries. In Christian symbolism also the ship takes the same significance. It was depicted riding in safety amidst storms as emblematic of the church in the early days surviving the direst persecutions. Frequently the mast and yardarm are used to signify the Cross and the peak of the mast is surmounted by a dove or the sacred monogram. The symbol of the ship is dilated on by early Christian writers, as Saint Clement of Alexandria. In the catacombs hanging lamps have been discovered in the form of masted ships, and the design appears frequently on the catacomb walls. Sometimes the ark of Noah takes the place of the masted ship. Often, however, in ancient times, as at present, the ship is introduced as an emblem of maritime power. In ecclesiastical art a ship has been pictured in the hands of Saint Jude; Saint Ursula has been depicted with a ship near her, or as landing from a ship; Saint Melanius has been portrayed as lying dead on a ship which is sailing against the stream; Saint Castor has been pictured saving a ship from sinking; Saint Werenfrid has been represented with a ship in his hand having a coffin in it; Saint Anselm has been portrayed holding the model of a ship, as has Saint Mary of Succours (Husenbeth). The term ship is used for the ecclesiastical vessel that holds the incense, but it is usually of *boat* form. The finest centerpiece for the banquet tables of the Middle Ages was a ship of gold or silver made as a masterpiece of the goldsmith and termed a *nef*.

CLEMENT W. COUMBE.

SHIP MONEY, a tax which had much to do with provoking the rebellion which cost Charles I his head. It was customary in England in times of extraordinary peril for the sovereign to call upon the seaports and maritime counties to supply ships-of-war for the national defense. The ships which took part in the defeat of the Spanish Armada were obtained in this way. No such peril existed when Charles I, in October 1634, ordered the magistrates of London and other seaport towns to provide ships-of-war, and also empowered the magistrates to levy a tax for that purpose. Resistance to the levy was met by further decrees, extending the tax to the whole kingdom, and directing that every landholder and other inhabitant be assessed according to his means, and the tax collected by distress if necessary. When John Hampden refused to pay the tax, and was brought to trial, the judges decided, eight to four, in favor of the crown. One of the early acts of the Long Parliament in 1640 was to declare the ship-money tax illegal and no attempt has since been made to collect ship money in England.

SHIP REGISTRY ACT approved Aug. 18 1914, provided for the admission of foreign-built ships to American registry for foreign trade, and for other purposes. In section 5 of the act entitled "An act to provide for the opening, maintenance, protection and operation of the Panama Canal and the sanitation and government of the Canal Zone," the words "not more than five years old at the time they apply for registry," were repealed. The president of the United States was authorized, whenever in his discretion the needs of foreign commerce may require, to suspend by order, so far and for such length of time as might be desirable, the provisions of law prescribing that all the watch officers of vessels of the United States registered for foreign trade should be citizens of the United States. Under similar conditions the president was also authorized to suspend the provisions of the law requiring survey, inspection and measurement by officers of the United States of foreign-built vessels admitted to American registry under this act.

SHIP RIGGING. The many special terms used to designate the various parts of the standing and running rigging in the days of the sailing vessel are given below:

THE STANDING RIGGING

Bobstay.
Bowsprit-shroud.
Martingale-stay.
Jib-boom guys.
Fore-stays.
Fore-topmast stays.
Inner-jib stay.
Outer-jib stay.
Flying-jib stay.
Fore-royal stay.
Fore-rigging.
Fore-topmast rigging.
Fore-topgallant rigging.
Fore-cap back-stay.
Fore-topmast back-stays.
Fore-topgallant back-stays.
Fore-royal back-stay.
Fore-lift.
Fore-topsail lift.
Fore-topgallant lift.
Fore-royal lift.
Main-stays.
Main-topmast stays.
Main-topgallant stays.
Main-royal stays.
Main-rigging.
Main-topmast rigging.
Main-topgallant rigging.
Main-cap back-stay.
Main-topmast back-stays.
Main-topgallant back-stays.
Main-royal back-stays.
Main-lift.
Main-topsail lift.
Main-topgallant lift.
Main-royal lift.
Mizzen-stays.
Mizzen-topmast stays.
Mizzen-topgallant stay.
Mizzen-royal stay.
Mizzen-rigging.
Mizzen-topmast rigging.
Mizzen-topgallant rigging.
Mizzen-cap back-stay.
Mizzen-topmast back-stays.
Mizzen-topgallant back-stays.
Mizzen-royal back-stays.
Crossjack lift.
Mizzen-topsail lift.
Mizzen-topgallant lift.
Mizzen-royal lift.
Jigger-stays.
Jigger-middle stay.
Jigger-topmast stay.
Jigger-topgallant stay.
Jigger-rigging.
Jigger-topmast rigging.
Jigger-topmast back-stays.
Jigger-topgallant back-stays.

THE RUNNING RIGGING

Fore-tack.
Fore-sheet.
Fore clew-garnet.
Fore-braces.
Fore lower topsail sheet.
Fore lower topsail clew-lines.
Fore lower topsail braces.
Fore upper topsail sheets.
Fore upper topsail clew-lines.
Fore upper topsail braces.
Fore lower topgallant sheet.
Fore lower topgallant clew-lines.
Fore lower topgallant braces.
Fore upper topgallant sheet.
Fore upper topgallant clew-lines.
Fore upper topgallant braces.
Fore-royal sheet.
Fore-royal clew-lines.
Fore-royal braces.
Fore-topsail halyards.
Fore-topgallant halyards.
Fore-royal halyards.
Fore-signal halyards.
Fore reef-tackles.
Fore topsail reef-tackles.
Main-tack.
Main-sheet.
Main clew-garnet.
Main-brace.
Main lower topsail sheet.
Main lower topsail clew-lines.
Main lower topsail brace.
Main upper topsail sheet.
Main upper topsail clew-lines.
Main upper topsail braces.
Main lower topgallant sheet.
Main lower topgallant clew-lines.
Main lower topgallant braces.
Main upper topgallant sheet.
Main upper topgallant clew-lines.
Main upper topgallant brace.
Main-royal sheet.
Main-royal clew-lines.
Main-royal braces.
Main-topsail halyards.
Main-topgallant halyards.
Main-royal halyards.
Main signal-halyards.
Main reef-tackles.
Main-topsail reef-tackles.
Crossjack tack.

Crossjack sheet.
Crossjack clew-garnet.
Crossjack braces.
Mizzen lower topsail clew-lines.
Mizzen lower topsail braces.
Mizzen upper topsail sheet.
Mizzen upper topsail clew-lines.
Mizzen upper topsail braces.
Mizzen lower topgallant sheet.
Mizzen lower topgallant clew-lines.
Mizzen lower topgallant braces
Mizzen upper topgallant sheet.
Mizzen upper topgallant clew-lines.
Mizzen upper topgallant braces.
Mizzen-royal sheet.
Mizzen-royal clew-lines.
Mizzen-royal braces.
Mizzen-topsail halyards.
Mizzen-topgallant halyards.
Mizzen-royal halyards.
Mizzen-signal halyards.
Crossjack reef-tackles.
Mizzen-topsail reef-tackles.
Jigger peak-halyards.
Jigger brails.
Jigger gaff-topsail sheet.
Ensign halyards.
British ensign.
Gaff-topsail halyards.
Vangs or Vanes.
Jigger outhaul.
Boom topping lift.
Boom guys.
Boom sheet.
Flying-jib sheet.
Outer-jib sheet.
Inner-jib sheet.
Fore-topmast stay-sail sheet.
Fore-bowline.
Main-topmast stay-sail sheet.
Main topgallant stay-sail sheet.
Main-royal stay-sail sheet.
Mizzen-topmast stay-sail sheet.
Mizzen-topgallant stay-sail sheet.
Mizzen-royal stay-sail sheet.
Jigger stay-sail sheet.
Jigger-topmast stay-sail sheet.
Jigger-topgallant stay-sail sheet.
Reef points.
Fore-buntlines.
Main-buntlines.
Crossjack buntlines.

SHIPBUILDING INDUSTRY AND CONSTRUCTION. The earliest history of shipbuilding and the development of the sailing ship and steamship will be found under the titles SAILING VESSELS; STEAM VESSELS.

United States.—Dependence on water transportation for trade and travel, both intercolonial and transatlantic, combined with an abundance of timber, the primary raw material of early-day vessels, gave rise to a shipbuilding industry in North America almost concurrently with the founding of the colonies. American shipbuilding got its start at the mouth of the Kennebec River in Maine, where, in 1607, the short-lived Popham colony built and launched the *Virginia,* "a faire pinnace of 30 tons" which made several Atlantic crossings. It was with this vessel that the Popham colonists repatriated themselves to England.

The first decked-over vessel built in America was the *Onrust,* launched at New Amsterdam in 1616. In 1631, the *Blessing of the Bay,* the first vessel built in America for transatlantic trade, was launched at Medford, Massachusetts. Her voyage to New Amsterdam in 1633 opened up a lively trade between the Dutch and British colonists. That launching at Medford was the first of an industry which thrived in Massachusetts for over 200 years.

The most conspicuous advance in early American shipbuilding was Dominie Peter's "great ship" of 300 tons, launched at Salem, Massachusetts, in 1641. This notable vessel exceeded the famous *Mayflower* by 120 tons and set the pace not only for the shipbuilders of the New World, but for the Old World as well, where few vessels so large had been equal to this product of a colony scarcely 20 years old.

Shipbuilding in America became and remained a strong and active industry for over two centuries because its products were good and they could be sold at a lower price than those of other nations. American ships cost less for one all-important reason, namely: the abundant supply of shipbuilding timber available at prices far cheaper than those obtaining in Europe. America presented an untapped supply of fine woods —white oak, live oak, yellow pine, hackmatack, locust, spruce, and tall, straight masting in the form of white pine—at a time when the scarcity of suitable timber in Europe was sorely felt. During the 16th, 17th, and 18th centuries the timber situation in England and on the Continent had gradually deteriorated. By 1700 only an eighth of England's forests remained and by 1800 there was a general timber famine throughout the shipbuilding nations of Europe. Hence, despite being in an initially unfavorable position as regards availability of capital, cheap and skilled labor, sails, cordage, and iron fittings, the American industry forged ahead and undersold the world until steam-engines supplanted sails and iron hulls took the place of wooden.

By 1700 Massachusetts was the scene of a fair amount of shipbuilding activity centered around Newburyport, Boston, Salem, and Plymouth County's North River. William Penn had instituted shipbuilding on the Delaware River in 1682 where it has persisted ever since, but favorable conditions in Holland, combined with a lack of enterprise on the part of the Dutch West India Company, caused the industry to lag at New York, the scene of many later-day triumphs of wooden construction. At the start of the 18th century, the colonial yards were turning out about 4,000 gross tons of shipping per year, most of which were small craft in the 20-to-200-ton range.

By 1676 the ports of Massachusetts had 30 ocean-going vessels of between 100 and 250 tons, besides some 700 smaller craft engaged in the coastwise trade. In 1700 Boston was the home port of 194 seagoing ships, while New York harbored 124. The 40-year period, 1674 to 1714, witnessed the launching of 1,332 vessels of 30 or more register tons each, of which about 240 were sold abroad to foreign owners, mainly English. Colonial American yards were fortunate in having a European market ready and willing to absorb that part of their capacity which the domestic market could not, a situation which was terminated by political developments in Europe shortly after the American Revolution and which, mainly for economic reasons, reoccurred for only a few short-lived intervals up to 1951. However, in 1774, approximately one third of the tonnage in England's merchant fleet was American-built.

While Massachusetts set the pace during the early days of American shipbuilding, there was considerable activity in most of the other colonies. The earl of Sheffield's *Observations on the Commerce of the American States* (London 1783) records that 389 vessels aggregating some 20,000 tons were built in America in 1769; of these Massachusetts accounted for 35 per cent in number and 40 per cent in tonnage. Sheffield's breakdown for 1769 is shown in the following table:

Colony	Number built	Aggregate tonnage	Average tonnage
Massachusetts	137	8,013	60
New Hampshire	45	2,452	55
Connecticut	50	1,542	31
Pennsylvania	22	1,469	67
Rhode Island	39	1,428	37
Maryland	20	1,344	65
Virginia	27	1,269	47
New York	19	955	50
South Carolina	12	789	65
North Carolina	12	607	50
New Jersey	4	83	20
Georgia	2	50	25

By 1775 the annual shipbuilding output of the colonies was approximately 35,000 gross tons.

Before the American Revolution, major vessels of between 50 and 400 gross tons were constructed mainly for the trade between the West Indies and North America and for trade with or sale to Europe. Whaling, in 1775, employed 300 vessels aggregating about 33,000 gross tons. The majority of American-built ships, up to that time were, however, small coastal and fishing vessels.

Unlike World Wars I and II, the American Revolution produced a serious depression in domestic shipbuilding. With the British Navy's harassment of the coastwise and offshore trades and with the English market denied them, the builders' principal outlets were closed. Construction for the Colonial Navy apparently was negligible as delivery of only eight vessels is recorded.

The post-revolution era saw the American builder more dependent on the domestic market for ships than ever before. In 1786 the British applied their navigation laws to the United States. These laws required that ships registered under the British flag be built in the British Empire, thus terminating the English market for American-built vessels, a condition which persisted until the repeal of those laws in 1849. Although an idle gesture in view of the economic advantages of building in American yards at that time, Congress in 1789 passed a registry law which required that American-flag ships be built in the United States. France did likewise in 1793, closing another mart for American ships.

The years between the American Revolution and 1829 were, for the most part, prosperous for shipbuilders in the United States. Backed by favorable legislation such as the Tariff Act of 1789, which caused lower customs duties to be charged for goods imported in American ships than those placed on goods entered from foreign hulls, and favored by construction costs, which at times were 50 per cent lower than those obtaining in Europe, American shipping and shipbuilding went on apace. Aided by discriminatory laws, able to take advantage of the Napoleonic disturbances in Europe, and requiring a much lower capital investment than their European contemporaries, American shipowners were in a fine competitive position, and, consequently, good domestic markets for ships prevailed.

In 1791 Alexander Hamilton, as secretary of the United States Treasury, reported that the American Merchant Marine aggregated 476,274 tons. In 1800 construction amounted to 995 ships having a combined tonnage of 106,000 tons, three times that built in 1775. Despite being set back by the Embargo Act in 1807 and 1808, the yards delivered 147,000 gross tons in 1811. The War of 1812 caused another depression in the shipyards but, in 1815, their production had risen to 156,000 gross tons.

Two events occurred during the post-revolutionary period which proved vital to the industry up to 1951 and seemed likely to continue to do so for the foreseeable future. In 1794 Congress authorized construction of the first six ships (including the famed *Constitution*) for the United States Navy. The navy has continued to be a customer down through the years, its importance as such increasing rapidly between the Civil War and World War II eras. After shipbuilding costs in the United States rose above and became prohibitively higher than those abroad, the compelling reason for the existence of the American industry was its potential contribution to the nation's naval power.

The second event was the enactment of a law in 1817, still in force in 1951, which restricted trade between American ports to ships built in the United States and operated under the American flag. Thus, despite having to charge more than foreign yards in later years, the construction of ships for the United States coastwise, and later its intercoastal and non-contiguous trades, has been limited, with few exceptions, to American yards since 1817. This has been a significant aid in preserving the industry.

The steam engine, a contemporary of England's Industrial Revolution, made its entrance on the commercial shipping stage in 1807 when Robert Fulton placed the *Clermont* in the Hudson River trade. Though its application was American, the engine was built in Britain by the firm of Boulton and Watt. In 1819, an American vessel, the *Savannah,* gained the distinction of being the first steam-engine equipped ship to make an Atlantic crossing. Although unsuccessful financially, the *Savannah* pointed the way to the gradual utilization of steam in ocean-going ships, a factor which swung the construction-cost advantage to England, where the low price of good British engines more than counteracted the high price of British wooden hulls. By 1850, a large wooden steamer could be built in Britain at a price 20 per cent below that for similar construction in the United States.

While steam undermined the competitive advantage of Americans engaged in building for the ocean trades, it proved the foundation of a strong and lively branch of the industry, that which built vessels for the inland river, Great Lakes, Hudson River, Delaware River, and Long Island Sound trades. With foreign hulls excluded by law, these trades created a good market for American builders who catered to them. Though in later years railroad competition virtually killed off the last three, the trades on the Mississippi River System and Great Lakes survived, waxed strong, and were still growing in 1951.

Steam entered the inland-river trades in 1811 when Nicholas Roosevelt, working for the Fulton interests, directed the construction of the *New Orleans* at Pittsburgh. Even at that date the upper Ohio River district was a shipbuilding area. In 1800 the 110-ton sailing ship *Saint Clair* was launched at Marietta, Ohio, and the *Louisiana,* a 300-tonner, has been built at Pittsburgh in 1804. Both of these vessels were destined for the ocean trades, which they joined after sailing to the Gulf of Mexico via the Ohio and Mississippi rivers. It was the advent of steam, however, that spurred the growth of river shipyards to the west and south.

During the period, 1830–1856, American shipbuilders enjoyed a market of increasing activity which reached boom proportions between 1847 and 1855, and began to drop precipitously in 1856. The wooden shipyards were further depressed by the Civil War, but the navy's sudden demand for steam-propelled iron warships caused a small war-born boom in American shipbuilding.

Among the several causes for the good ship markets prior to 1857 were the increasing transatlantic passenger traffic (mainly immigrant); expanding exports of American cotton to England; the discovery of gold in California in 1849 and in Australia in 1851; the reopening of the market for American ships in England, brought about by the repeal of Britain's navigation laws;

and the business boom which preceded the panic of 1857.

Establishment of regular American-flag transatlantic passenger service in 1816 led to the development of the American sailing packets which catered to the rapidly expanding immigrant trade. In 1854, 460,000 people arrived in American ports, more than 18 times the number of arrivals in 1830, and most of this traffic went in American hulls. Large, fast, and well-appointed, the packets offered fine accommodations for first-class passengers, had ample room for a payload of immigrants, and carried high-rate cargoes. Construction of these vessels centered about New York. Reaching sizes of 1,000 tons in 1830, 1,500 in 1849, and 1,700 in 1854, these sailing ships represented some of the best products of contemporary American yards.

"King Cotton" furnished the impetus for a flourishing business in freight-ship construction. Usually smaller and cruder than the packets, freighters made up nearly 50 per cent of the American Merchant Marine in the 1850's. The lion's share of the construction for this market went to the yards in Maine, making that state the center of American shipbuilding.

The famed American clipper ship, designed to meet the needs of the China tea trade in the late 1840's, and refined and exploited in the booming, gold-inspired California trade of the early 1850's, evolved from a combination of the complementary features of the fast, sharp-ended ships produced in the Chesapeake Bay yards for such dubious employments as slave and blockade running, and those of the better transatlantic packets and freighters. The result was a longer, narrower craft with concave underwater lines forward and aft, horizontal keels, and small deadrise and bilge radius midships. To these characteristics were added sail plans noted for their area and height. Ships built in this manner were famous for their speed and seaworthiness, some making the long, arduous voyage from New York to San Francisco via Cape Horn in less than 100 days and the easier return trip in less than 80 days. With favorable winds they could outrun many steamers of the 1940's, some being able to perform in the 16-knot range.

The first true clipper, *Rainbow,* was built at New York in 1845. New York and Boston were the hotbeds of clipper construction. Ranging in size from 1,000 to 2,000 tons in their heyday, they were such financial successes that the freights of their maiden voyages often fully repaid the capital which their owners had invested.

The peak year of the boom, 1855, saw 2,024 vessels aggregating 583,450 gross tons delivered; 4 years later, the figures had fallen to 870 vessels totaling 156,602 gross tons.

Spurred by the mail subsidy acts of 1845 and 1847 about two dozen large wooden paddle-wheel steamships were constructed, notable among them being the Collins Line transatlantic steamers *Arctic, Atlantic, Baltic, Pacific* and *Adriatic,* the latter measuring 4,144 gross tons and costing over a million dollars. Their wooden construction, however, did not measure up to the stresses and strains of ocean-going steam propulsion. The entry of British iron steamers into the transatlantic trade in the 1850's made these craft obsolete and, with the abandonment of the mail subsidies in 1858. construction of such ocean-going wooden steamships in the United States came to a halt,

While American wooden construction was enjoying its heyday, iron shipbuilding in the United States was going through its birth pangs. In 1844, some 22 years after the first iron steamer had been built in Britain, the firm of Betts, Harlan, and Hollingsworth of Wilmington, Delaware, delivered the coastwise steamer, *Bangor,* the first significant iron ship built in America.

Near to sources of domestic iron, the Delaware and Hudson rivers became centers of iron shipbuilding; in 1951 two of America's largest privately owned shipyards, the Philadelphia Naval Shipyard, and several small but active establishments were located on the Delaware; shipbuilding on the Hudson, however, had faded into comparative oblivion.

Up to the Civil War, iron shipbuilding in the United States faired poorly. America lacked the essential tools and skills which were developed for iron construction in Britain and Europe, as well as the driving incentive brought into play by the scarcity of wood abroad. In the 1850's the average annual production of iron ships in America had only reached 1,515 gross tons. The picture changed between the Civil War and World War I.

Inability to compete with Europe in the construction of metal hulls, be they driven by sail or steam, and the low price of American-built wooden sailing vessels, limited the growth of iron shipyards in the United States. Despite several attempts by the federal government to subsidize iron steamship lines, the real impetus for the growth of metal shipbuilding in America, a sizeable market protected from foreign competition, did not come into being until the United States began to build a modern navy. The tide turned when orders for four steel warships, the *Atlanta, Boston, Chicago,* and *Dolphin,* were placed in 1883. Thenceforward the navy was steel shipbuilding's most important customer, the mainstay of its growth and existence.

Wooden construction continued to dominate the American scene until the late 1890's, whereas, in Britain, the annual output of iron and steel tonnage outdistanced wood in the mid-1860's.

Although the markets for high-class wooden hulls—clippers and packets—and for freighters for the cotton trade failed to revive after the Civil War, a new trade, that of shipping grain from the west coast to Europe, caused the construction of wooden sailing vessels to remain an active industry. But it was a specialized industry which found itself concentrated on the Maine coast, close to the best remaining supply of lumber and favored by low wage rates and dawn-to-dusk working hours. Elsewhere wooden shipbuilding declined rapidly. In 1875, Maine launched 80 per cent of the wooden square riggers built in the United States.

Sailing vessels could compete against steam only in the long hauls such as the California grain trade, where speed was unimportant. The wooden ships for such work were much larger than those built in the 1850's. In the 1870's square riggers of 2,000 gross tons were common and in the 1880's 3,000 tonners were built. Far larger than the clippers and carrying less sail, these ships could handle bigger cargoes and be manned by smaller crews. They were economically competitive with European sailing ships up to the 1870's, when the cost of British sailing vessels built of iron finally fell to their level. Between 1860 and 1880 British yards turned out

SHIPBUILDING INDUSTRY AND CONSTRUCTION

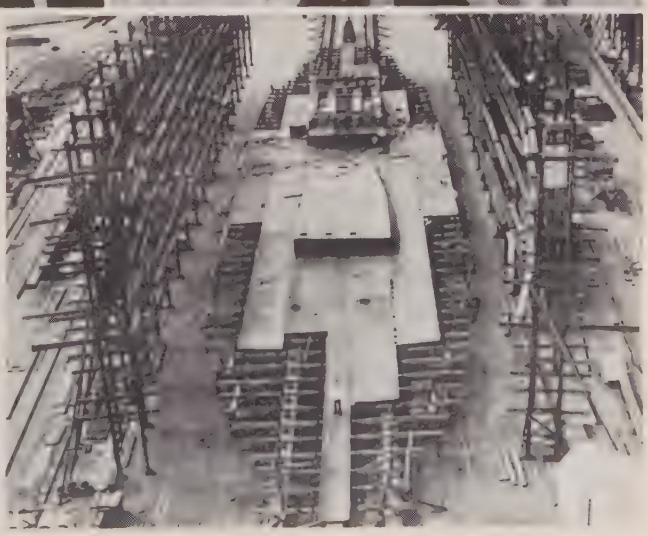
Marine Engineering and Shipping Review

Marine engineers working in the mold loft of a large shipyard, where the lines of the ship are drawn in full size on the floor, from which are developed wood and paper templates of the hull's structural members.

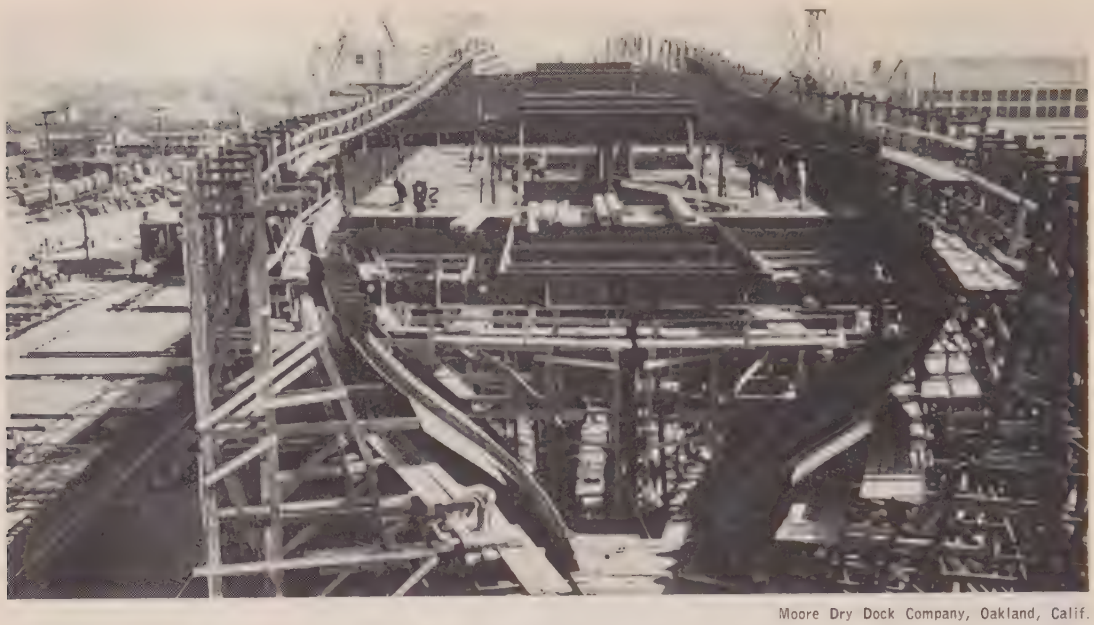
Above left: A plate fabricating shop, where the steel plates are laid out in accordance with the templates and cut to shape. A machine-driven plate-cutting torch is shown in the foreground.

Above right; The building berth is readied for construction and the keel plate is laid in position.

Right: The ship's bottom plating is laid into position.

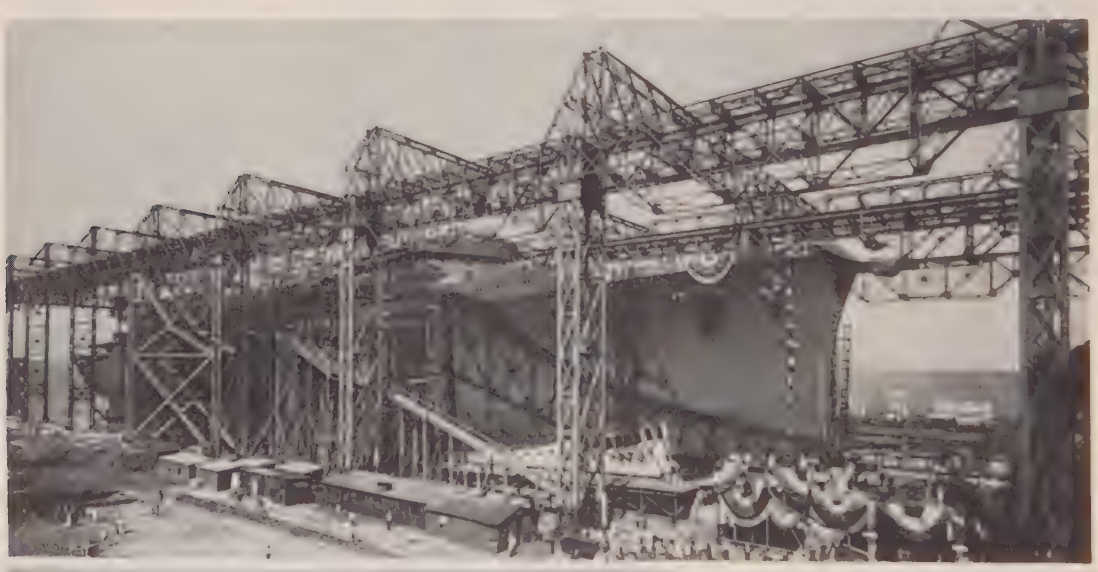


(Above left) Bethlehem-Fairfield Shipyard, Inc.; (above right) North Carolina Shipyard; (right) Turner Richards Studio, Tacoma



Moore Dry Dock Company, Oakland, Calif.

The ship takes shape. Plating, framing, and transverse bulkheads are in place and the work of decking over has already begun.



The *America* as she appeared on her launching day. Note the overhead crane ways which served to hoist her many structural components into position.

The side launching of the Liberty ship *William C. C. Claiborne*.

(Bottom) Simmons-Boardman Publishing Corporation

more iron sailers than were built of wood during that period in the United States. The upshot was an oversupply of sailing ships competing for the world markets which caused a rapid decline in freight rates and, consequently, a drastic drop in the demand for American-built wooden square riggers. By 1880 the market for Maine-built square riggers had collapsed and it never really recovered. Whereas, in the period 1870–79, 625,000 gross tons of wooden square riggers had been built in the United States, the output for the period 1880–89 dropped to 200,000 tons. The last of the breed was *Aryan,* launched on the Kennebec in 1894. The plight of the American yards specializing in wooden construction was further aggravated in the 1880's when British yards began in earnest to build sailing vessels of steel. Cheaper, lighter, and stronger than their iron contemporaries, they proved unsurmountable competition for the American ships of wood.

The construction of metal sailing craft in the United States never gained more than a toehold. American metal sailing-ship costs precluded competition in the unprotected world ship markets and the comparatively low cost of American-built wooden sailers prevented their entry into the protected field created by the coastwise trades. Hence, in the latter part of the 19th century American shipbuilding was divided into two distinct branches, namely: that of building wooden sailers and that of building metal steamers. So different were the requirements of capital investment, managerial ability and skill that very few of the wood yards bridged the gap to metal construction. The remainder went under after the last boom in wooden building, that involving the construction of wooden schooners for the protected coastwise trades.

The wooden schooner grew in size from a three master of less than 400 tons, built in 1865 to a six master of 3,730 gross tons built in 1910. Far easier to handle and requiring much smaller crews than the square riggers, they were ideal for handling bulky cargoes in the coasting trades. They filled the gap caused by the collapse of the square rigger market and enjoyed boom times, the first in the period 1900–1905 and the second in the era of World War I. After that the business of building wooden sailing craft for commerce died out.

Iron shipbuilding gained stature very slowly after the Civil War. The spurt of naval orders inspired by the *Monitor-Merrimac* engagement of 1862 died out with the peace and until the orders of 1883 metal construction for the navy was almost dormant. Between 1866 and 1884 only 10 iron vessels, all comparatively small, were delivered under naval contracts.

The American Steamship Company, founded in 1871, placed orders with William Cramp & Sons Ship & Engine Building Company, Philadelphia, for four iron passenger steamships, the first large American-built craft of this type destined for the transatlantic trade. Some 340 feet long, measuring 3,100 gross tons, and fitted with a screw propeller driven by a compound steam engine of 2,000 indicated horsepower, the *Pennsylvania,* the first of the group, entered service in 1873.

Spurred by the subsidy act of 1872, the Pacific Mail Steamship Company, which operated between New York and the Orient via Panama and San Francisco, contracted with John Roach's Delaware River Iron Shipbuilding and Engine Company, Chester, Pennsylvania, for two iron steamers, *City of Peking* and *City of Tokyo.* Delivered in 1874, they were then the largest vessels built in America; their twin compound engines drove them at 15 knots.

Despite such advances, the American iron shipbuilders' average annual output for the 1870's was only about 18,700 gross tons.

The navy, as heretofore mentioned, came to life in the 1880's. Between 1885 and 1897, some 56 sizeable warships, mainly built of steel, were delivered. This fleet had a displacement tonnage of about 183,000 and contained machinery totaling 312,000 horsepower. Costing over $53,000,000, it was the spur which brought about modernization of American metal shipyards. Included in this group were the 10,000-ton battleships *Indiana, Massachusetts,* and *Oregon;* the latter, built by the Union Iron Works at San Francisco and delivered in 1893, is famous for her exploits in the Spanish-American War.

The high-point of pre-1900 merchant shipbuilding was the construction of two first-class transatlantic liners, *Saint Louis* and *Saint Paul,* for the International Navigation Company. Delivered by the Cramp Yard in 1894 and 1895, respectively, they were 535 feet 8 inches long. Propelled by twin screws, each driven by a 10,250-horsepower quadruple-expansion steam engine (giving each vessel a total of 20,500 horsepower), these ships could make 20 knots. Each vessel measured 10,700 gross tons and displaced 15,600 tons at its load waterline.

In the years 1890–1899 annual average output of merchant vessels in America, wood and metal, was 225,732 gross tons, that of metal vessels, including steamers, wind ships and barges, was 86,434 gross tons, and that of metal steamers, 72,782 gross tons. In the same period, annual output of steel naval craft averaged 22,114 displacement tons, 24,259 being built in 1899. Of the average of 72,782 gross tons of metal merchant steamers turned out annually during the period 1890–1899, only some 29,300 were built by the seaboard yards which had to face foreign competition. During the same years the average annual output of comparable metal ships in Britain was over 33 times as great.

In the 1890's and early 1900's the character of American metal shipyards underwent a fundamental change. Spurred by an act passed in 1886, which required that only domestically manufactured components could be used in American warships, new yards, with the requisite tools to accomplish this end, were formed. Requiring formidable sums to create them, the new yards took on the form of corporate enterprises and drew their capital from sources outside the shipbuilding industry. Primarily armament plants, formed to build warships for the United States Navy, they were much larger, employed more men, and were far more scientifically laid out than the largest American metal shipyards of the 1880's. For example, whereas a first-class metal yard in the early 1880's could be created for less than $100,000, the Newport News Shipbuilding and Dry Dock Company, formed in 1890, at Newport News, Va., represented, in 1894, an investment of $3,500,000, covered 82 acres of land, and had a half-mile frontage on the James River. Comparable yards brought into existence near the turn of the century were the Fore River Ship and Engine Company at Quincy, Mass., and the New York Shipbuilding Company, at Camden,

New Jersey. These yards became and remained, as of 1951, major contributors to America's naval power and merchant fleet, the names of the latter two having been changed to Bethlehem Steel Company, Shipbuilding Division, Quincy Yard, and New York Shipbuilding Corporation, respectively.

Despite vastly improved facilities, and the manner in which naval orders supported the inherent high overhead of same, American yards in the early 1900's, as in the post World War II era, could not compete with foreign yards in the world market for merchant tonnage. High wages, the high cost of steel, and inability to specialize on certain types, due to lack of volume, caused American prices to range from 30 to 50 per cent higher than British in 1905. In the years 1900 to 1913 average annual output of metal merchant tonnage in the United States was 248,225 gross tons, 231,662 being produced in 1913. The navy kept the seaboard yards going during this period by taking delivery of a fleet of 157 vessels displacing 878,108 tons, for which it paid the yards $198,500,000. In this respect it is interesting to note that the 60,000-ton aircraft carrier ordered from the Newport News Shipbuilding and Dry Dock Company in 1951 had an estimated price of $218,000,000. Only in the protected coastwise, Great Lakes, and inland-river trades could American yards find customers for merchant tonnage. Great Lakes tonnage accounted for nearly 40 per cent of all American merchant construction during these years.

Since American shipowners simply could not afford to buy American-built ships and expect to compete with foreign contemporaries, at the end of 1913 only 10 per cent of American trade was carried in vessels flying the Stars and Stripes.

World War I had scarcely started when America's dearth of ocean-going tonnage made itself felt. The merchant fleets of Britain and France were engaged in waging the war and Germany's ships were bottled up. American exports piled up on the seaboard, necessary imports failed to arrive, freight and charter rates soared, and prices of ships went up 400 and 500 per cent. Unable to get deliveries due to the tremendous backlog in European yards, foreign owners began to order ships in America; American owners did likewise.

With the country's foreign trade paralyzed by the ship shortage, a concerned Congress passed the Shipping Act of 1916, signed on September 7 of that year. The act created the United States Shipping Board, which was empowered to form a $50,000,000 corporation to build, buy, hire, operate, and maintain an ocean-going merchant fleet and to regulate American shipping.

On April 16, 1917, ten days after the United States entered the war, the Emergency Fleet Corporation was organized, its duty being to provide the largest possible merchant tonnage in the shortest possible time. The corporation embarked on a shipbuilding program larger than the world had ever known. By the time the United States entered the war there was considerable activity in the existing yards; 431 steel merchant vessels, totaling 3,068,431 deadweight tons, were under construction on July 11, 1917, the day the president requisitioned all steel merchantmen.

The corporation began its labors by taking over a number of the existing yards and entering upon the construction of new ones. The new yards were primarily ship-assembly plants, components being obtained from other industries capable of fabricating them. The larger old-line firms confined their efforts to far more complicated tasks of naval construction, their main reason for existence.

In the ensuing years, America proved beyond doubt that it was technologically equipped to build steel ships in quantity. The following table includes all the vessels completed and delivered to the Emergency Fleet Corporation, from America's entry in the war until the program ended in 1922, including the 431 requisitioned in 1917:

VESSELS CONSTRUCTED BY EMERGENCY FLEET CORPORATION

(Includes all vessels of 5 gross tons and over)

	Number	Dead Weight	Approximate Gross
Steel Vessels			
Passenger and cargo	25	308,972	298,798
Transport	22	179,775	166,210
Cargo	1,420 *	9,509,234	6,339,489
Refrigerator	19	161,400	107,600
Collier	9	70,350	46,900
Tanker	138	1,363,030	908,687
Tug (ocean)	46	**	**
Tug (harbor)	8	**	**
Barge	6	22,456	22,200
Wood Vessels			
Cargo	304	1,120,600	747,567
Tanker	1	4,700	3,134
Sailing vessel	10	34,500	22,650
Barge	86	277,000	277,000
Finished hull	115	447,700	447,700
Tug	77	**	**
Concrete Vessels			
Cargo	4	13,500	9,000
Tanker	8	60,000	40,000
Composite Vessels			
Cargo	18	63,750	42,000
Total	2,316	13,636,967	9,478,935

* Includes 30 vessels built in Japan and 4 in China.
** No deadweight can be shown for these tugs.
Source: Bureau of Research, U.S. Shipping Board.

In 1918 America delivered 3,025,806 deadweight tons, while Britain's war-swollen yards put out 2,500,000, the first time since the halcyon 1850's that new American tonnage had outpaced British. In the peak year of 1919, 6,384,423 deadweight tons left American yards.

The 430 naval vessels produced in the seven years, 1916–1922, totaled 983,392 displacement tons, 155,642 tons coming out in 1918 and 221,255 tons in 1919.

Although containing a few bright spots, the years 1923 to 1935, inclusive, were generally miserable for shipbuilding in America. On the one hand there was the tremendous war-born merchant fleet, capable of supplying more tonnage than American owners could absorb, even when sold at bargain prices; on the other was foreign competition, which could build comparable units for 30 to 60 per cent less. Added to these depressing factors, was America's signature to the agreements of the Reduction in Armament Conference of 1922, which caused cancellation of contracts for seven United States battleships and four battle cruisers. The emergency yards, lacking versatility, swiftly closed; the old-line firms, with their overhead situations aggravated by the curtailment of naval work, grasped at every straw to keep going. Battleship yards contracted for trawlers, ferryboats, railway cars, and hydraulic turbines.

Two Merchant Marine acts, those of 1920 and 1928, contained provision to encourage merchant construction. The inducements of the 1920 act were quite inadequate; only 15 vessels aggre-

gating 101,511 gross tons were inspired by its construction-loan provisions up to and including 1928. The 1928 act, which provided mail contracts and more liberal construction loans for vessels engaged in foreign trade, produced better results. By 1933, 31 combination passenger-and-cargo ships, 9 tankers, and 2 seatrains, aggregating 446,875 gross tons, were completed under the act's provisions. By then, the general depression of the 1930's was in full swing and shipbuilding faced heavy going. In 1934, there were only two oceangoing ships delivered, tankers which aggregated 9,544 gross tons. Total production of American merchant craft in that year was 66,649 gross tons. The years 1923 to 1935, inclusive, witnessed an average annual American output of 213,080 gross tons of all classifications of merchant craft, and 35,040 displacement tons of naval craft, about 56 per cent of the 1900–1913 average yearly naval output.

The provisions of the 1928 act failed to induce construction of dry-cargo ships, and the mail subsidies produced undesirable, if not scandalous, conditions. The Congressional investigations of 1935 resulted in a thorough overhaul of American policy for shipping subsidies, enacted into law as the Merchant Marine Act of 1936. Briefly, it provided for two types of subsidies, construction and operating. American owners meeting the conditions stipulated are paid the difference between their operating costs and those of their foreign competitors, the subsidy being subject to recapture to the extent that profits exceed 10 per cent, and the difference between foreign and American construction costs for comparable ships are paid by the government, provided foreign costs are not more than 50 per cent cheaper than American.

The act created the Maritime Commission to carry out its provisions and empowered the commission to build ships for its own account, which could be sold, chartered, or operated by that agency.

The difficulties inherent in these provisions are accurate determination of foreign construction and operating costs, as well as the capital investment on which the American owner's profits are to be calculated. Fifteen years after passage of the act, these problems lacked satisfactory solutions. Comparability of ships is difficult to establish.

Empowered to do so by the act, the Maritime Commission embarked on a long-range construction program in 1938 by placing orders for 50 high-grade freighters. The plan, then, was to build 50 ships a year for 10 years. With the outbreak of World War II, in 1939, the sights were raised to 150 per year, and, by August, 1940 to 200. Congress, in April, 1941, authorized the commission to order 100 more of these high-grade vessels.

Hard pressed by losses inflicted by German submarines, Britain, in December, 1940, placed an order for sixty freighters in America, to be constructed in two new yards especially organized and built for this program. A modified version of these vessels was designed shortly thereafter, which became known as the Liberty ship. As part of the emergency shipbuilding program announced by President Roosevelt on January 3, 1941, some 332 Liberty ships were ordered by September 12 of that year. These ships were laid down in new yards designed to turn them out in quantity. The first Liberty ship was delivered on December 30, and the second on December 31, 1941.

While the World War II shipbuilding program resembled that of World War I, it was carried out on a much larger scale. An important difference, however, was centralization of design; instead of permitting each yard to build to its own plans, the same set of drawings was followed by all the emergency plants. An industry with a scant thirty-eight yards, equipped with 120 ways, 300 feet long or longer, in 1939, was bolstered to 84 yards with 614 building berths employing 1,700,000 men and women by 1944. Merchant-type construction rose from 426,533 gross tons in 1940 to 10,142,776 in 1944. The following table shows that 5,777 ships aggregating 39,921,000 gross tons were built for the Maritime Commission alone in the years 1939–1945:

VESSELS DELIVERED UNDER THE UNITED STATES MARITIME COMMISSION SHIPBUILDING PROGRAM, 1939–1945, INCLUSIVE

Summary, by types	Number built	Deadweight tonnage	Gross tonnage
A. Major types			
1. *Dry cargo*			
a. Standard cargo	541	5,349,000	3,834,000
b. Emergency cargo	2,708	29,182,000	19,447,000
c. Victory cargo	414	4,492,000	3,151,000
2. *Tankers*			
a. Standard tankers	643	10,695,000	6,613,000
b. Emergency tankers	62	670,000	448,000
B. Minor types			
1. Coastal and concrete cargo	360	1,558,000	1,183,000
2. Coastal and inland tankers	64	214,000	151,000
3. Ore carriers	21	344,000	196,000
4. Concrete barges	80	368,000	338,000
5. Wooden barges	41	87,000	52,000
6. Harbor tugs	75	*	18,000
7. Seagoing tugs	49	*	41,000
8. Other minor types	37	30,000	1,000
C. Military types			
1. Cargo attack ships (Navy AKA)	93	534,000	649,000
2. Tankers			
a. Oilers (Navy AO)	36	624,000	391,000
b. Gasoline coastal tankers (AOG)	36	63,000	47,000
3. Transports			
a. Transport attack ships (Navy APA)	178	864,000	1,321,000
b. Hospital transports (APH)	3	11,000	25,000
c. Troop transports	92	700,000	1,168,000
d. British transports	13	34,000	89,000
4. Other military types			
a. Tenders	2	15,000	16,000
b. Escort aircraft carriers	58	191,000	567,000
c. Tank landing ships (Navy LST)	75	171,000	36,000
d. Frigates (Navy PF)	96	96,000	139,000
Totals	5,777	56,292,000	39,921,000

* No deadweight tonnage for tugs.

Source: *A Statistical Summary of Shipbuilding Under the U.S. Maritime Commission During World War II.*

In the years, 1940–1945, inclusive, 1,556 combatant vessels and large auxiliaries were built for the navy; total displacement tonnage for this fleet was 4,663,026. Add to that 4,099 naval landing craft, 3,444 small auxiliaries, 324 ships for the Coast Guard, and 12,795 small vessels for the army to gain an inkling of the staggering accomplishments of wartime shipbuilding. With the aid and guidance of the small nucleus of shipbuilders employed in the prewar yards, complete strangers to the industry devoted their energies to shipbuilding with remarkable success. As in World War I, the larger old-line firms worked in comparative secrecy building America's

mighty two-ocean navy, while the prodigious but comparatively simpler efforts of the emergency yards, which built the Liberty and Victory ships, received widespread notice in the press.

For shipbuilding, the aftermath of World War II was quite similar to its predecessor. The emergency yards closed down swiftly and the old-line firms pulled in their belts. With few exceptions, the existing, war-built, high-class standard dry-cargo ships and tankers met the needs of shipowners. Up to August, 1951, only one post-war dry-cargo ship had been delivered by an American yard. An increase in the world's consumption of petroleum started a tanker-building boom in late 1947, which temporarily buoyed the industry, but before the start of the Korean War in June 1950, its effects had worn off and the big yards were hard pressed for work. Three important passenger vessels were laid down in the postwar era, namely the American Export Line's 682½-foot *Independence* and *Constitution,* and the United States Lines' 980-foot superliner *United States,* the former two being delivered and the latter launched in 1951.

The international tension accompanying the Korean War brought into play an all too familiar situation in shipbuilding. Expansion of the steel industry to meet the threat of war caused a demand for new ore carriers which soon filled all available ways on the Great Lakes. The oil thirst of a world on the brink of war led to new tanker orders, defense needs stepped up building on the inland rivers, and by September, 1951, the Federal Maritime Administration, successor to the Maritime Commission, had ordered thirty-five high-speed dry cargo ships of the Mariner class. Expected to cost about $9,000,000 each, making them the most expensive dry-cargo ships ever ordered, these vessels were conceived with the thought that their 22-knot top speed would enable them to run away from modern submarines. Important orders for building and converting naval craft were announced in the summer of 1951 and, once again, American shipbuilding faced a hectic feast which could, to some extent at least, have been avoided by a national policy of building ships at a comfortable pace during the peacetime or "famine" years. On Jan. 1, 1951, there were on order 32 large merchant vessels totaling 391,688 gross tons; by September 1 of that year, the threat of war had swollen the total to 88 merchant ships with an aggregate gross tonnage of 1,087,416.

SHIP CONSTRUCTION

Before a shipbuilding contract is signed, the prospective owner and builder will have arrived at an agreement regarding the general dimensions, characteristics, and appearance of the vessel. This agreement is embodied in a set of documents known as the contract plans and specifications. Not to be confused with the numerous working drawings which must be produced during the course of construction, the contract plans (usually ten to twenty in number) show the general arrangement, scantlings (sizes of structural members) and principal dimensions of the vessel, while the specifications describe quite thoroughly the details of hull construction, machinery installation and outfit which are not amenable to delineations on the contract plans.

Contract plans and specifications for ocean-going ships come from one or two sources. The prospective owner may engage an independent naval architect to develop a set describing the vessel which will meet his needs, and then ask one or more shipyards to submit bids based on same, or he may describe his needs to a shipyard and ask the yard to submit contract plans and specifications to serve as a basis for negotiations.

Hence, before the contract is signed the basic design of the ship which will meet the prospective owner's requirements as to cargo-carrying capacity, speed, cruising range, fuel economy and the like has been worked out, and the shipbuilder has prepared a price estimate and set a date of delivery based on the contract plans and specifications.

Establishment of the delivery date required formulation of a tentative master schedule of construction events. Upon the signing of the contract, the master schedule is placed into effect and expanded as to details. A schedule for the production of detailed working drawings is established, based on the sequence in which the several sections of the ship's structure will be built. As rapidly as plan production permits, materials are ordered to be delivered in time to permit construction to proceed in accordance with schedule.

As soon as the line drawing (the drawing which describes the shape of the hull) is completed, the mold loft commences to reproduce it in full size on the mold loft floor. With the aid of this full-size delineation, and the structural working drawings produced in the drafting room, wood or paper templates outlining the shape of the plates and frames which will form the hull are developed by the loftsmen and sent to the steel-fabricating shops. The geometry of the ship is the mold loft's province, and making flat templates of the warped surfaces involved in a ship's plating requires painstaking care and a very practical knowledge of geometry.

While the loft work is in progress the building berth is prepared so that, when the keel-laying date occurs, all will be in readiness to begin assembly of the fabricated keel and bottom plating as it arrives from the shops.

In the fabricating shops the outlines of the templates are transferred to the plates, after which they are cut by torch or shears, rivet holes punched out as required, and bent to shape. In a modern welded-hull, very little riveting is required, hence, the amount of hole punching for some present-day vessels is negligible.

Some plates and most frames must be heated in a furnace so that they may be bent to the shapes required. So called "furnace plates" are avoided where practicable because they are expensive to fabricate. It is fascinating to watch the work on the bending slabs where the glowing frames and plates are bent precisely to the forms dictated by the mold loft. Here, steel templates are required, since, if made of wood, they would go up in flames upon contact with the hot steel to be bent.

It often proves economical to sub-assemble certain structural sections on welding platens and to deliver the sub-assembly, substantially complete, for erection on the ship as a unit.

The introduction of hand and, later, machine welding to the shipbuilding process in the 1930's made increased use of sub-assembly practice desirable from both an economic and technological viewpoint. Widespread employment of heavy-lift cranes, which enable the yards to handle larger sections, has permitted further exploitation of the economies of sub-assembly.

Although installation of machinery after launching is still common, up-to-date practice requires installation prior to the launch. Hence, orders for boilers, condensers, turbines, gears, shafting, and propellers, along with auxiliaries, are placed early in the shipbuilding process so that they will be available when the hull is ready to receive them. While the larger yards are equipped to build their own machinery, it often happens that such equipment is ordered from other firms specializing in certain items. In fact, the modern tendency, with certain notable exceptions, is for shipyards to become builders of hulls and installers, rather than manufacturers, of machinery and outfit components.

As the structural components and sub-assemblies are brought to the building berth, they are erected in position and welded or riveted to the adjoining structure. The keel and bottom plating is followed by the floors (vertical bottom framing made of plate) and inner-bottom plating. Bulkheads, usually in the form of sub-assemblies erected as a unit, follow, and then the side frames and plating. If machinery is to be installed prior to launching, the erection of engine room structure above the inner bottom may be held up until the major units are fastened to their foundations and, then, that section of the ship's hull is erected around them.

As the structure of a compartment is completed, it is tested for water tightness. Completion of tightness tests signifies that a compartment is ready for outfitting at which time pipe fitters, electricians, and other mechanics accomplish their work, all in accordance with schedules set up to prevent one trade from interfering with another.

When all the work scheduled to be completed on the building berth has been accomplished, the ship is ready for launching. Usually this stage finds the vessel decked over with superstructure partially installed and machinery installation nearly complete, but with much outfitting work remaining. There are three methods of moving the ship from dry land to water, namely: end launching, side launching, or floating. End launching, the most common, and, also, the most complicated method, sees the ship slide stern first into the water. This is accomplished by erecting a set of inclined parallel timber tracks, known as a standing ways, beneath the vessel. These extend out into the water far enough for the ship to be completely waterborne before the fore poppet passes over the way ends. Several coats of hard and soft greases are applied to the top of the standing ways; then a set of skids, known as sliding ways, are placed on the grease, on top of which, and at right angles to them, are placed hard-wood wedges at close intervals. Between these wedges and the hull of the ship a cradle is constructed. Towards the stem and stern, where the vessel narrows down, the cradle builds up and slants inward to maintain contact with the hull. The forward end of the cradle is a complex structure. Known as the fore poppet, it bears the whole non-waterborne weight of the ship when, near the end of the launching, the stern's buoyancy causes it to rise upwards and leave the standing ways. Besides being strong, it acts as the pivot about which the ship rises as it enters the water.

Usually on the night before the launching, the work of transferring the weight of the ship from the keel blocks and shores, which supported it during construction, to the launching cradle is begun. This is accomplished by driving in the wedges between the cradle and sliding ways with sledge hammers until the cradle lifts the ship off the blocks and shores. The sliding ways are shored to prevent the ship from moving before the appointed time.

At the time the ship is to be launched, usually at the peak of high tide, which affords the maximum depth of water over the way ends, a trigger mechanism is actuated to release the last restraint on the sliding ways and the force of gravity causes ship, cradle, and sliding ways to slip down the inclined standing ways into the water. The successful end launching of a large ship is a masterpiece of engineering, requiring consideration of a multitude of details and coordination of effort which few laymen appreciate.

Side launchings, common on waterways which are too narrow to permit end launchings, while more spectacular, are apparently just as safe, if not safer, than end launchings. Here the ship lies at right angles to the ways, of which there may be eight or ten, and slides sideways into the water. On the Great Lakes, ships over 600 feet long have been side launched into graving dry docks less than twice as wide as the vessel's maximum beam.

Floating, from a technological viewpoint, is, by far, the most preferable manner of launching, but requires a formidable capital investment to create the necessary building basin or wet dock. Here the ship is built in a type of graving dry dock called a building basin. The floor of the basin is below the level of the sea and the basin is shut off from the water by a caisson. When the ship is ready to be "launched," water is admitted into the basin, the ship floats, the caisson is floated and removed from the basin's entrance, and the ship towed out and brought to an outfitting dock. The largest ship built in America, the 980-foot *United States,* was floated from a building basin in 1951. The building basin presents the added advantage of permitting the ship to be built on a level platform rather than on an incline, which is a necessary evil associated with end launchings.

After the launch the ship is moved to an outfitting dock where the superstructure is completed and the myriad items which make up the vessel's outfit are installed. The outfitting pier usually is equipped with a heavy-lift crane which can handle anything which did not go into the ship prior to launching. This may merely be a comparatively light set of stacks and masts, but, on the other hand, it might be 16-inch-gun turrets for a battleship. On the whole, however, the outfit consists of a multitude of comparatively small items which must go into place in proper sequence. The liner *Independence,* launched early in June of 1950, required seven months at the outfitting dock, even though her machinery was installed prior to launching.

The completed vessel is subjected to dock trials and sea trials. When undergoing dock trials, the ship's machinery is turned over with the vessel tied to a pier. Once satisfied that all is in working order, the ship is taken out for sea trials which may simply consist of an 8-hour run at rated power. Important vessels undergo more complex trials to furnish data on speed and fuel consumption at several power outputs, as well as to determine maneuvering characteristics.

Satisfactory completion of trials is followed by delivery to the owner. A large ship is the

most complex product of modern industry. Were a modern passenger liner to serve merely as a floating hotel its construction would be a formidable undertaking. But all its components must withstand the ravages of the sea, the corrosive action of salt-laden air, the buffetting of wind and water unabated.

High standards are commonplace in the construction of ships and marine machinery The shipbuilder's work, from drawings to final product, are subject to rigid inspection from three and often four or five separate sources namely: the prospective owner, the classification society, and one or more governmental agencies. The owner, who naturally wants his ship to be built in accordance with specification, may employ his own inspectors; he, also, in most instances, will engage a classification society to class his ship. The classification society is a private non-profit organization which certifies to insurance underwriters that the ship is built to meet the rigors of the service for which it is intended. It has a body of rules for the construction of hull and machinery, based on engineering theory and accumulated experience. Starting off with inspection of drawings, it determines that the plans are drawn up in accordance with the rules and, then, inspects the ship as it is built to ascertain that the structure and materials are as called for by the drawings. Several governmental agencies, notably the U.S. Coast Guard, inspect parts of the hull and machinery to see that they meet the requirements of laws passed to safeguard the lives of passengers and crew. Hence a wealth of knowledge and experience far greater than any individual firm could afford to assemble is devoted to ascertaining that the shipbuilder's product is seaworthy.

Aside from the number of skills which are employed in designing a ship and in fabricating its components, there is the all-encompassing task of the shipyard's production-control department, which prepares the building schedules. Each part must be assembled into the whole in proper sequence and in accordance with schedule. Simple to state, the sheer mass of detail involved makes planning and scheduling a complex proposition requiring much experience.

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SHIPIBO, shē-pē'bō, South American Indian tribe of Panoan stock, living in the forested regions of the upper Ucayali River, Peru. Their existence was reported by Franciscan missionaries who visited them in 1651, but a mission established for them in 1764 was, after a brief period of success, massacred in 1767, and the Shipibos have since rarely come in contact with the whites. They are great wanderers with no fixed places of migration, and are skilled boatmen and fishermen.

SHIPKA PASS, Balkan Peninsula, extends between Bulgaria and the territory formerly known as Eastern Rumelia, since 1885 incorporated with Bulgaria, at a height of 4,600 feet above sea-level, and is 87 miles distant from Rustchuk and 50 miles northeast of Philippopolis. In the hot fight between the Russians and Turks, 1877, the Russians held the position and Suleiman Pasha lost 20,000 men in his attempt to take Fort Nicholas, on the summit of the pass, Aug. 21-26 and Sept. 9-17, 1877.

SHIPLEY, town, England, of Yorkshire (West Riding), lies three miles north-northwest of Bradford, on the river Aire. The large parish church of St. Paul is a fine modern Gothic specimen. The principal industry is the manufacture of woolens and cloths, and the quarrying of stone. Pop. (1948 est.) 32,600.

SHIPPEN, William, American surgeon: b. Philadelphia, Pa., Oct. 16, 1736; d. Germantown, Pa., July 11, 1808. He was graduated at Princeton in 1754, took his M.D. at the University of Edinburgh in 1761 and engaged in practice at Philadelphia in 1762. He began the first series of lectures on anatomy given in America, at Philadelphia, in 1762, and in 1765 became professor of anatomy and surgery at the newly-established medical school at the College of Philadelphia; from 1780 until he retired in 1806 he was professor of anatomy, surgery and obstetrics at the University of Pennsylvania. In 1777–1781 he was director general of the military hospitals of the United States.

SHIPPENSBURG, borough, Pennsylvania, in Cumberland County; altitude 649 feet; 11 miles northeast of Chambersburg; on the Pennsylvania; Western Maryland; and Reading railroads. The borough is situated in a grain-producing area; there are manufacturers of clothing, furniture, paper novelties, and flour. Shippensburg was founded in 1730 by Edward Shippen. It is the seat of a state teachers college. Pop. (1940) 5,244; (1950) 5,710.

SHIPPIGAN, shĭp-ĭ-găn', seaport town, Province of New Brunswick, Canada, in Gloucester County, at the southeastern entrance to Chaleur Bay, opposite Shippigan Island, 70 miles east of Bathurst. It is a terminus of the Inter-Canadian National Railway system, and has steam ferry communication with St. George's Bay, Newfoundland. It has a fine harbor, a maritime trade and valuable fisheries. Beyond Shippigan Island, Miscou Island is frequented by sportsmen for plover, the best in Canada.

SHIPPING AND SHIPBUILDING TERMS. The more common terms used in shipbuilding have been gathered here for the convenience of the student who wishes to read the articles on ship and shipbuilding.

Abaft.—Behind, at the rear, as abaft the beam, that is somewhat within a semi-circle to the rear of a vessel's midship beam. See BEAM in this article.

Aft.—At, near or toward the stern of a vessel. Also AFTER.

After Peak.—The aftermost tank or compartment immediately forward the stern post.

After Perpendicular.—A line perpendicular to the base

line at the after edge of the stern post or center of rudder stock. It shall not be further forward of the after end of the summer draft waterline than 4% of the length of that waterline. See also FORWARD PERPENDICULAR.

Amidships.—In the vicinity of the middle portion of a vessel as distinguished from her ends. The term is commonly used to convey the idea of general locality. Technically it is a definite location midway between the forward and after perpendiculars.

Anchor.—A heavy steel or iron instrument, attached by a chain or hawser to the bow or stern of a vessel, for dropping to the bottom and holding a ship that is not tied to a dock. It usually has a ring or shackle in the head, a longitudinal shank, and a cross arm ending in flukes (hooks designed to catch in the sea bottom). Occasionally both bow and stern anchors are used.

Athwartships.—Across the ship, at right angles to the keel.

Ballast.—Any weight or weights, as sea water, concrete, pig iron, etc., placed in the lower part of a vessel to help keep her upright. A vessel without cargo usually requires ballast to give sufficient draft to be seaworthy in bad weather and occasionally to prevent her being topheavy.

Bark.—A three or four masted vessel square rigged except on the aftermost mast which is fore and aft rigged.

Barkentine.—A three masted vessel square rigged on the foremast and fore and aft rigged on the main and mizzen masts.

Beam.—An athwartship member supporting a portion of a deck; also the width of a ship; also a straight steel framing member as an I-beam.

Belay.—To make a rope fast by turning it around a cleat or bitt or removable pin (the latter called a belaying pin).

Below.—Any part of a ship below a deck; the equivalent of the landman's "downstairs."

Berth.—A bunk or bed as for a sailor; also a place for a ship to lie.

Bilge.—The rounded portion of a ship's hull, between the side and the bottom.

Bilge Keel.—A fin fitted to the hull on each side of a ship at the turn of the bilge to reduce rolling.

Bitt.—A pair of posts, usually combined in a heavy steel casting, attached to the weather deck of a vessel or on piers or wharves for securing the mooring lines or hawsers, as towing bitt, or mooring bitt. More specifically called bollards when attached to piers or wharves.

Block.—A mechanical contrivance having one or more grooved pulleys mounted in the casing or block usually fitted with a hook shackle or ring by which it may be attached. A device commonly used for making a turn in hoisting ropes, and increasing leverage by means of and according to the number of pulleys used.

Bobstay.—A stay holding the bowsprit down to the stem.

Boom.—A long, heavy spar, pivoted at the lower end, as for hoisting cargo, or holding the foot of a fore-and-aft sail.

Boss.—An enlargement or curved swelling portion of a ship's hull at the point where a propeller shaft passes through.

Bow.—The forward part of a ship, also called the bows.

Bridge.—A high transverse platform, often forming the top of a bridge house, extending from side to side of the ship and from which a good view of the weather deck and the sea may be had. An enclosed space called the pilot house is erected on the bridge in which are installed the navigating instruments such as the compass and binnacle, the control for the steering apparatus, and the signals to the engine room. The term is also applied to the narrow elevated walkways, called connecting bridges, which connect the bridge deck with the poop and forecastle decks. This type of bridge is usually found on tankers for convenience in heavy weather.

Brig.—A two-masted vessel, square rigged on both masts; also a jail.

Brigantine.—A two-masted vessel square rigged on the foremast and fore and aft rigged on the main mast.

Bulkhead.—One of the various vertical partitions in a ship's hull, either fore and aft or athwartships.

Bulwark.—The raised side of a ship above the weather deck, topped by a rail.

Bunker.—A compartment low down in the hull for carrying coal or other fuel.

Buoyancy.—Ability to float; also the resulting upward pressure of water on a floating body.

Calking.—Making tight a seam between planks, as by filling with oakum, hence tightening up any joint so as to be water-tight; or closing a seam in a vessel with oakum and a chisel. Steel plating is calked with a pneumatic hammer peening and driving the material together until water- or oiltight at the joints.

Camber.—A slight upward bend; the upward curvature of a deck by which it is higher at the centerline than at the deck side to facilitate drainage of water from the deck.

Cant.—Something set at a slope or angle, as the cant frames—sloping deck beams where a vessel's body narrows toward the stern (and sometimes the bow).

Capstan.—An upright (vertical shaft) windlass adapted to heaving in lines.

Carline.—Any short fore and aft timber for connecting beams, or the like, as a mast carline, abutting against a mast or at a deck opening.

Center Line.—The fore and aft middle line of a vessel from stem to stern.

Centerboard.—A vertical board or plate pivoting to swing in a well extending through a boat's bottom, as a form of drop-keel.

Chain Locker.—Compartment in forward lower portion of ship in which anchor chain is stowed.

Chinsing.—Same as calking.

Chock.—A block of wood or steel used as a filling or supporting member; also a heavy fitting or casting through which ropes or hawsers may be led.

Cleat.—A wood or iron fitting having two horns around which a rope may be wound.

Clew.—The lower corner of a square sail, or the aft lower corner of a fore and aft sail. Also a metal fastening or eye worked into the corner, for tying a rope.

Coaming.—The vertical edge of a hatchway or skylight; a low curb to keep out the water. The lower strake of deck house plating, usually heavier than the plating above it.

Coffer Dam.—A narrow void between two bulkheads or floors to insure liquid not leaking from one tank to another.

Cradle.—A heavy framework for supporting a vessel, as in dry dock or while being hauled up on a marine railway.

Crosstrees.—Beams placed athwartships at the head of a mast.

Cutwater.—Sharp-edged projection set in front of a vessel's stem at the waterline.

Davits.—Heavy vertical pillars with the upper ends bent to a curve, between which a boat is supported and swung on deck. The boat is loaded on the deck, and then the davits are turned so that the boat hangs overboard, when it may be lowered to the water. Modern mechanical davits are arms that shift the boat overside either by sliding on a track or they may be hinged arms moved by a worm and nut mechanism.

Deadeye.—A block with holes through which ropes are run after the manner of a pulley block, but without sheave or pulley.

Deadlight.—A term applied to a port light that does not open.

Deadweight.—The difference between the light displacement and the full load displacement of a vessel; the total weight of cargo (or ammunition, gasoline), fuel, water, stores, dunnage, passengers, and crew and their effects that a ship can carry when at her maximum allowable draft.

Deadrise.—See RISE OF BOTTOM.

Deck.—A deck or platform in a ship corresponds to a floor in a building. It is the plating, planking, or covering of any tier of beams above the inner bottom forming a floor, either in the hull or superstructure of a ship. Decks are designated by their location as upper deck, main deck, etc., and forward lower deck, after superstructure deck, etc. Decks are sometimes identified by letters such as the "A" deck or "C" deck.

Depth Molded.—The vertical distance from the molded base line to the top of the freeboard deck beam at side, measured at midlength of the vessel, or to the uppermost continuous deck of shelter deck vessels.

Displacement.—The volume of fluid displaced by a freely floating and unrestrained vessel, the weight of which exactly equals the weight of the vessel and everything on board at the time the displacement is recorded. Displacement is usually expressed in either cubic feet or in tons of salt or fresh water (long tons, 2240 lbs.).

Double Bottom.—A term applied to the space between the inner and outer skins of a vessel called respectively the "inner bottom" and "shell," usually extending from bilge to bilge and for nearly the whole length of the vessel fore and aft, and subdivided into water or oil tight compartments. In some cases, and generally in warships, the inner bottom is carried above the bilges to a deck at or near the waterline.

Draft.—The depth of water that a vessel draws, measured vertically from the lowest points of the hull to the surface of the water. If the propellers project below the lowest point of the hull that establishes the extreme draft.

Drag.—The designed excess of draft, aft, over that forward, measured from the designed waterline. The drag is constant and should not be confused with trim.

Dry Dock.—A dock into which a vessel may be floated and then, by removing the water, leave the interior dry for repairing. There are floating dry docks which may

be partially submerged, the vessel being lifted out of the water by pumping the ballast water from the dock.

Dunnage.—Heavy pieces of wood or the like used to prevent cargo from shifting its position when the vessel is rolling at sea.

Even Keel.—When a boat rides on an even keel, its plane of flotation is either coincident with or parallel to the designed waterline.

Fair Lead.—The lead of a rope in a direction that will not permit it to foul or be subject to excessive friction; also a small fitting for changing the direction of a rope without causing too much friction.

Fake.—A single turn or coil of a line, rope or cable.

Fall.—A hoisting rope used with a block or tackle.

Fender.—A shield-like device for hanging on a vessel's hull at the waterline, to receive the shock of contact with a dock, pier, etc

Fidley.—A term applied to the top of a boiler casing through which pass the smoke flue and uptake.

Fore.—At, near or toward the bow, as foredeck, fore-ship (the bows), foreyard (the lowest yard of a foremast).

Fore and Aft.—Extending or situated longitudinally of a vessel; in line with the keel.

Fore Peak.—The watertight compartment at the extreme end of the vessel below decks. The forward trimming tank.

Forecastle.—The forward superstructure part of the hull, formerly the quarters for the crew.

Forward.—The locality at, near or toward the bow.

Forward Perpendicular.—A line perpendicular to the base line and intersecting the forward side of the stem at the designed waterline. Also see AFTER PERPENDICULAR.

Framing.—The framework or stiffening members; the skeleton of a ship.

Freeboard.—The part of a vessel's side that is free and clear when she is loaded, measured as the vertical distance from the freeboard deck to the water line.

Funnel.—Smokestack of a vessel.

Futtock.—A foot-hook or curved timber in the frames of a wooden ship, extending from a floor-timber or cross-timber upward.

Futtock-Plate.—An iron plate on a mast head for holding the dead-eyes of the futtock-shrouds.

Futtock-Shrouds.—Short shrouds at the junction of a mast with its topmast.

Galley.—The place where the cooking is done on a vessel; the kitchen.

Gangway.—A passageway or opening in the bulwarks for use in boarding a ship. Also a walkway from a pier to a ship.

Gantline or Girtline.—A rope reeving through a single block aloft and used for hoisting or lowering rigging, drying clothing and hammocks, etc.

Garboard Strake.—The strake of bottom shell plating next to the keel.

Gimbal.—A support for a compass or other object which it is desired to maintain in level position, made in pairs, and permitting the object supported to swing level regardless of a ship's rolling or pitching.

Gross Tonnage.—See TONNAGE.

Gudgeon.—A lug cast or forged on the stern post for the purpose of hanging and hinging the rudder. Each is bored to form a bearing for a rudder pintle and is usually brushed with lignum vitae or white bearing metal.

Gunwale.—A term applied to the line where a weather deck stringer intersects the shell. The upper edge of the side of an open boat.

Halliard or Halyard.—A light rope for hoisting a sail, yard, etc.

Hatch.—A large opening through a deck, as for taking in cargo.

Hawse.—The hawse-hole is a hole in a vessel's side for the passage of a hawser, and when not in use is closed with a hawse-plug. A hawse-pipe is a large fitting attached to the bow through which the anchor chain passes.

Hawser.—A large rope, such as 5 to 10 inches in circumference, used for securing a vessel to a pier or to another vessel.

Head.—The forward or upper end of a vessel, mast, sail, etc. Also a term for a ship's toilet.

Heel.—The inclination of a ship to one side, caused by wind or wave action or by weights on board.

Helm.—The tiller; also, the tiller and rudder mechanism collectively; also the direction in which the tiller is turned, being opposite to the rudder's position.

Hogging.—Bending strain lengthwise of a ship, tending to allow the bow and stern to settle lower than the section amidships. See SAGGING in this article.

Hold.—The space below the lowest deck; the main compartment in the lower part of a vessel, for carrying cargo.

Hounds.—A pair of projections at a masthead, for supporting the top trestletrees and rigging.

Hull.—The body of a ship or vessel; the framing as covered with planking or plating. The term is sometimes used to include the decks.

Inboard.—All inside a ship, toward the center line.

Intercoastal.—Occurring between ribs, frames, etc. The term is broadly applied, where two members of a ship intersect, to the one that is cut.

Jacob's Ladder.—A flexible ladder, usually rope, used by pilots in boarding ship at sea, also for entering ship's holds.

Keel.—A centerline strength member running fore and aft along the bottom of a ship. It is composed either of long bars or timbers scarfed at their ends or by flat plates connected together by riveting or welding. See also BILGE KEEL.

Keelson.—A beam or stringer, extending over or along a keel; an auxiliary or strengthening keel-piece.

Kingpost.—A strong vertical unstayed post used instead of a mast to support a derrick boom.

Knightheads.—A pair of uprights supporting the bowsprit on either side.

Knot.—A unit of speed, equaling one nautical mile (6,080.20 feet) an hour, as when a ship goes ten nautical miles per hour, her speed is ten knots.

Launching.—A term applied to the operation of transferring a vessel from the building ways into the water. End launching and side launching methods are employed; the former method is used when the vessel is built at an angle, usually at right angles, to the water front and the vessel is launched stern first, while in side launching the vessel is built parallel to the water front and launched sidewise.

Length Between Perpendiculars.—The length of a ship measured from the forward perpendicular to the after perpendicular. In naval practice, the total length on the designed water line.

Length, Overall.—The length of a modern ship measured from the foremost point of the stem to the aftermost part of the stern, but not including such movable objects as the ensign staff.

Lines.—The shape or contour of a vessel. When drawn full size on the floor of a mold loft, the templates may be made directly from them.

Longitudinal.—A term applied to the fore and aft girders in the bottom of a ship. These girders are usually made up from plates and shapes and are sometimes intercoastal and sometimes continuous. Also fore and aft members corresponding to beams.

Magazine.—A compartment or storage room on a vessel of war for the safe storage of ammunition.

Margin Plate.—The outer boundary of an inner bottom, usually sloping, and connecting it to the shell.

Marlin.—A double threaded, left handed tarred cord, about ⅛" diameter, made of hemp.

Martingale.—A vertical spar under the bowsprit, a dolphin striker; also a lower stay for a jib boom.

Mast.—A long pole of steel or wood, usually circular in section, one or more of which are usually located, in a nearly upright position, on the center line of a ship and stayed by rigging. Originally intended for carrying sails, they are now more generally used as supports for the rigging, cargo and boat handling gear and wireless equipment. Also see KINGPOST.

Metacenter.—The center of buoyancy of a listed vessel is not on the vertical center-line plane. The intersection of a vertical line drawn through the center of buoyancy of a slightly listed vessel intersects the center-line plane at a point called the metacenter.

Metacentric Height.—The distance from the metacenter to the center of gravity of a vessel including her deadweight load. If the center of gravity is below the metacenter the vessel is stable.

Midship.—See AMIDSHIPS.

Mold Loft.—A space used for laying down the lines of a vessel to actual size and making templates therefrom for laying out the structural work entering into the hull.

Mooring.—Anchoring or securing a ship to a pier or moorings so that she will not be free to swing with the tide or current.

Net Tonnage.—See TONNAGE.

Oakum.—A substance made from soft vegetable fibre such as hemp and jute impregnated with pine tar. It is principally used for calking the planking on wood decks of steel vessels and for calking all the planking on wood ships where watertightness is desired. It is also used for calking around pipes.

Outboard.—Away from the center line, toward or beyond the side of a ship.

Overhang.—Any portion of the hull or superstructure of a vessel outside a line drawn vertically from the waterline.

Panting.—The in and out pulsation of shell plating under the influence of varying temperature, strains, pressure, etc.

Peak.—The highest point of a fore and aft sail. See AFTER PEAK and FORE PEAK.

Pier.—A wharf built out into the water at right angles or obliquely to the shore. Long narrow piers are known

as finger piers. The end of any pier is called the pierhead.

Pillar.—A column or stanchion, as for supporting the deck.

Pintle.—A pin on the rudder, turning in a gudgeon forming a hinge on which the rudder turns.

Platen.—Skids on which structural parts are assembled for welding or riveting into subassemblies.

Poop.—The after, upper superstructure of the hull of a vessel where the steering gear is commonly located.

Port.—The left hand side of a vessel, when facing forward, opposed to starboard. Also an annular opening in the hull, a porthole, airport, cargo-side port.

Propellor.—A device of angular blades, arranged to balance each other and rotate rapidly in the water, driving a vessel on the principle of a screw. It has almost wholly superseded the paddle wheel because it is mechanically superior.

Purchase.—Any mechanical advantage which increases the power applied, such as a block and tackle.

Quarter.—The part of the side of a vessel's stern that is aft of the main chains; also the part of a yard that is outside the slings.

Quarter Deck.—That portion of the weather deck between the poop and the mainmast. Formerly reserved for officers' use, now rarely fitted in modern vessels.

Rail.—The upper edge of the bulwarks. Also applied to the tiers of guard rods running between the top rail and the deck where bulwarks are not fitted.

Rake.—Inclination from the perpendicular, applied especially to the degree of backward inclination of a vessel's masts or funnels. A craft is said to be rakish when her masts or funnels have a more than ordinary lean away from the upright.

Ratline.—A small cross-rope between the shrouds equivalent to the "rung" of a ladder.

Rig.—The style of arrangement of the ropes, sails, spars, etc., of a vessel, frequentiy used in compound words, as square rig, fore and aft rig, etc.

Rigging.—The cordage or wire rope equipment of a vessel. The permanent ropes are called standing rigging and the movable ones running rigging.

Rise of Bottom.—The amount that the flat portion of a ship's bottom is sloped above the horizontal from the keel to the side of the ship. Usually called deadrise.

Roll.—The motion of a vessel from side to side, causing an alternate raising and lowering of each side of the decks.

Rudder.—A device used in steering or maneuvering a vessel. The most common type consists of a flat slab of metal or wood, hinged at the forward end to the stern or rudder post. When made of metal, it may be built up from plates, shapes, and castings, with or without wood filling, or it may be a casting. The rudder is attached to a vertical shaft called the rudder stock, by which it is turned from side to side.

Rudder Post.—A heavy vertical post at the after end of the stern frame, which supports the rudder. See STERN FRAME.

Rudder Stop.—A fitting to limit the swing of the rudder.

Sagging.—A straining of the ship that tends to make the middle portion lower than the bow and stern; opposed to hogging.

Sampson Post.—See KINGPOST.

Schooner.—A vessel with two or more masts having fore and aft sails on all masts.

Scuppers.—Drains from decks to carry off accumulations of rain water, condensation, or sea water. The scuppers are placed in the gutters or waterways on open decks and in corners of enclosed decks, and connect to pipes leading overboard.

Sea Anchor.—A float, as of broken spars, lashed together and thrown out to windward from a disabled vessel to serve as a drag, that it may ride out a gale bow on. Usually provided for lifeboats.

Shaft.—A very heavy, long cylindrical steel forging for connecting the engine with the paddle wheel or propeller.

Shaft Tunnel.—In a modern steamship, an enclosed alleyway containing the shaft, and running fore and aft from the engine room to where the shaft emerges. Also called shaft alley.

Sheave.—A pulley wheel as used in a block for turning a rope. The word is primarily used for the grooved wheel, but the entire pulley block is sometimes called a sheave.

Sheer.—Fore and aft rise of the deck lines giving curvature to the deck.

Sheer Strake.—The upper strake of the main shell plating, just below the bulwarks.

Sheet.—A line or tackle from the clew of a fore and aft sail to the deck or from the after end of a boom to the deck.

Shell Plating.—The steel plating forming the outer skin of the hull.

Ship.—A sailing vessel, of three or more masts, square rigged on all masts; also a large power driven craft; popularly, any large floating vessel.

Shrouds.—Two or more stout ropes, often of wire, from a masthead to the rim or side of a ship, constituting a part of the standing rigging, and being supplied with ratlines serving as a rope ladder for ascending and descending. The stay ropes or chains of a topmast or bowsprit are also sometimes termed shrouds.

Sloop.—A fore and aft rigged sailing vessel with one mast.

Snubbing Post.—A post or pile at a pier or wharf, around which a cable can be turned, to check the motion of a vessel in landing.

Spar.—Any round timber for supporting a sail or sails or for handling cargo as a mast, yard, boom, etc.

Sparring.—Wood strips, usually 2″ x 6″ spaced 6″ apart on the inboard side of the frames to keep the cargo away from the shell plating.

Stability.—The tendency of a ship to remain upright, resisting rolling and pitching. See METACENTRIC HEIGHT.

Stanchion.—Columns or supports for decks, hand rails, etc. Stanchions are made of pipe, steel shapes, or rods according to the location and purpose they serve.

Starboard.—The right hand side of a vessel when facing forward; opposed to port.

Stay.—The rope, whether fibre or wire, that supports the lower masts, topmasts, top-gallant masts, etc., in a fore and aft direction. Backstays often lead to the deck edge well abaft of the mast.

Stealer.—A strake of shell or deck plating that does not extend all the distance to the bow or stern.

Stem.—A nearly vertical member forming the extreme bow of a ship, formerly a very heavy timber continuation of the keelson, now a stout forging or casting running from the keel to the weather deck.

Stern.—The after end of a vessel's hull.

Stern Frame.—A large casting or weldment attached to the after end of the keel to form the ship's stern. It holds the rudder post and in a single screw ship includes the propeller post with an aperture for the propeller.

Strake.—A term applied to a continuous row or range of plates. The strakes of shell plating are usually lettered, starting with A at the bottom row or garboard strake.

Stringer.—A term applied to a fore and aft girder running along the side of a ship and also to the outboard strake of plating on any deck. The side pieces of a ladder or staircase into which the treads and risers are fastened.

Tack.—The lower forward corner of a fore and aft sail.

Tackle.—A set of ropes, pulley-blocks, hooks, etc., constituting a hoisting equipment, as a block and tackle.

Taffrail.—The rail around the top of the bulwark or rail stanchions on the after end of the weather deck.

Tank Top.—The inner or upper plating of a ship's double bottom, as considered from the inside.

Throat.—The corner of a fore and aft sail at the gaff jaws.

Thrust-Block.—A heavy bearing for receiving the thrust or pressure of a propeller shaft.

Tie Plate.—A single course of plating run fore and aft under the beams of a wooden deck to strengthen the structure.

Tiller.—The fore and aft arm attached horizontally to a rudder head for operating the rudder.

Tonnage.—*Gross:* The entire internal cubic capacity of a vessel, except for certain exempted spaces, expressed in terms of "tons" taken at 100 cubic feet each. *Net:* The internal cubic capacity of a vessel which remains after the capacities of certain specified spaces have been deducted from the gross tonnage to allow for certain spaces not available for cargo—expressed in terms of "tons" taken at 100 cubic feet each. Tonnage should not be confused with displacement or deadweight. It is a volumetric term as distinguished from weight.

Transom.—The aftermost transverse frame in a ship.

Transverse Frame.—An athwartship member of a ship's framing forming a rib.

Trestletrees.—A pair of timbers set at right angels to and near the top of a lower mast to support the mast above.

Trim.—To change by ballasting the inclination of any floating vessel relative to her designed waterline when the vessel is floating on an even keel, without making her unstable. Classification, registration, and other authorities having jurisdiction usually provide that any vessel shall have tanks for liquid ballast, fore and aft, port and starboard, prior to classification or registration.

Tumble Home.—An inboard sloping of a vessel's side above the line of greatest beam.

'Tween Decks.—The space between any two continuous decks.

Vertical Keel.—Fore and aft vertical plating extending longitudinally along the center of a flat plate keel. Also called center keelson.

Waist.—The central section of a ship, between the poop deck and the forecastle.

Warping.—The shifting of a floating vessel to a new

position by means of a cable (often called a warp) attached to a pile or bollard on a dock.
Waterline.—The lowest visible part of a ship's hull when in the water; hence, a line corresponding with such level, as the load waterline, light waterline, etc.
Weather Deck.—A deck exposed to the weather having no overhead deck completely covering superstructure.
Welding.—The process of fusing and uniting metals by the application of intense heat without compression or hammering.
Well.—A compartment or boxed-in space low down in a vessel's hull, as for enclosing a pump, a propeller shaft or for holding water, etc. Also a low portion of weather deck between higher superstructures.
Wharf.—A landing place or platform built out or into the water for the berthing of vessels and running parallel with the shore line.
Winch.—A hand or power driven machine having one or more drums for winding rope. Used for hoisting or for handling the ship's lines.
Yard.—A spar for carrying sail, set athwartship and the principle member of a square rig.
Yardarm.—The tip of a yard, of historical interest as the proper place from which to hang a pirate.

CLIFFORD C. KNERR,
Secretary, Shipbuilders Council of America.

SHIPPING BOARD, United States. Created Sept. 7, 1916 by congressional enactment, it controlled the Emergency (later Merchant) Fleet Corporation. Abolished June 10, 1933, its functions were assumed by the Commerce Department; then (Oct. 26, 1936) by the U.S. Maritime Commission; lastly by the Maritime Administration, Commerce Department, May 24, 1950.

SHIPPING SUBSIDIES, in the broader economic sense, any bounty paid by a government with the object of encouraging the building and navigation of merchant ships. Under this definition would be included, and rightly so, the postal subventions paid by many governments for regular mail service between home and foreign ports, for the largest effect of such service is the development and maintenance of a merchant marine.

Subsidies to shipping have been classified as direct and indirect: the first where money is paid to the shipowners; the second where they are favored in other ways. Direct subsidies have been granted by various nations and at various times upon five different basic plans, as follows: (1) on the number of days of actual sailing in the year; (2) on the year's mileage; (3) on the tonnage of the vessels engaged in the trade; (4) on the tonnage as modified by speed; (5) on a scale in which tonnage, speed and the amount of cargo actually carried in the year are controlling factors. Indirect subsidies are of great variety, including government loans at low interest to shipbuilders; free registry; bounties to certain industries which produce export goods; remission or reimbursement of canal and port dues; and restriction of coastal trade to domestic shipping.

Most of the maritime nations have adopted the principle of shipping subsidies. France has given the most money, but without the increase in her merchant marine that such expenditure might be expected to induce. At the beginning of World War I (1914), Japan was paying out in subsidies annually about $7,000,000; and Japan's merchant fleet has grown and prospered exceedingly, but so many other factors are to be considered that it is an open question whether the system of subsidies is to be given the credit. On the other hand, Great Britain built up by far the largest of all national merchant marines without direct subsidies. The methods employed by several countries in recent years in fostering their merchant fleets are arranged below in alphabetical order.

Belgium.—No subsidies.

Denmark.—No subsidies; no mail subventions.

France.—Until the outbreak of World War II the French merchant marine enjoyed subsidies based on gross tonnages and dates of construction. These were intended to compensate for the special taxes imposed on the merchant marine by social legislation for the benefit of seamen. Also until 1939 the merchant marine received government aid in the form of long term credits at low interest for construction of new ships. After 1939 both types of legislative aid ceased. The only credits of an economic kind favoring French shipping in the Merchant Marine budgets after World War II have been the subventions granted the Cie. Générale Transatlantique and the Cie. des Messageries Maritimes in return for agreements to service certain routes with specific types of ships, these ships to make a specified number of voyages. The reciprocal obligations of the government and the two companies are set forth in conventions.

Great Britain.—No subsidies to British shipping in foreign trade. There are three subsidies paid directly or indirectly to assist coastwise shipping and United Kingdom consumers who receive goods by coaster. The first, known as the Coasting Liner Freight Equalization Scheme, enables the coastal liner companies which run in competition with the railways to quote rates in reasonable relationship with railway rates. The second, known as the Coal Freight Refund Scheme, equates the cost of carrying coal by coasting tramp vessels with that of moving it by rail; the scheme has the double effect of preventing the higher cost of seaborne coal from falling on consumers who must receive their coal by sea, and attracting to coasters cargoes which, in many cases, would otherwise pass by rail. The third subsidy, initiated in the early 1890's, is paid to David MacBrayne Limited, who maintain the steamship services between the western Highlands and islands of Scotland. Its object is to reduce freight rates and passenger fares for the benefit of the inhabitants of these sparsely populated areas. All these subsidies are subject to frequent review.

Netherlands.—In principle no credits are given by the Netherlands government to shipping companies. Modest credits were granted during some years following the economic world crisis of 1930.

Norway.—Subsidies (partly as an excess payment for mail service) to vessels on regular routes in the coastal trade. No subsidies to oceangoing ships; on the contrary, since World War II they have been subject to especially heavy taxation. Reimbursement of import duties paid on foreign material used in Norwegian shipyards for building or repairs cannot be regarded as subsidies to shipping, but to the shipyards.

Russia.—All shipping lines of the USSR are state owned and operated.

Spain.—Navigation bounties to Spanish ships manned by Spanish crews, based on mileage per ton gross; construction subsidies per gross registered ton, with additional 10 per cent for each knot of speed above 14; postal subventions.

Sweden.—No subsidies.

United States.—Coasting trade reserved to American ships; heavy mail subventions. The government program as to ships built during World War I and subsequently in government

yards was laid down in the Merchant Marine Act of June 5, 1920. This act was modified by the Merchant Marine Act of June 29, 1936, and by an amending act of June 23, 1938.

In the United States the first act authorizing postal subventions was that of March 3, 1845. Power was given to the postmaster general to make contracts for payments of specified rates on weight of mail carried to foreign ports—24 cents per half ounce for ports 3,000 miles distant; 10 cents per half ounce to Mexico and the West Indies. In 1847 a contract was made with the Ocean Steam Navigation Company for a mail service between New York and Bremen and Havre. The company was to receive $100,000 for six return voyages to Bremen per year and $75,000 for six voyages to Havre. In 1850 the Collins Line, plying to Liverpool, agreed to accept $19,250 per voyage, making 20 voyages a year. A number of similar contracts were made about the same time, but in 1858 the granting of mail subventions was abandoned and vessels carrying the mails were allowed only the sea postage plus the inland postage on mails carried. Postal subventions were allowed to lines running between New York and Rio de Janeiro and between the Pacific coast and China, but were discontinued in 1875 after running 10 years. In 1891 a law was enacted authorizing the postmaster general to make contracts with American shipowners for carrying the mails between American and foreign ports. Steamships were placed in four classes: iron and steel vessels of not less than 8,000 tons with a speed of 20 knots per hour; iron and steel vessels of not less than 5,000 tons, with a speed of 16 knots; iron and steel ships of not less than 2,500 tons and a speed of 14 knots; iron, steel and wooden ships of not less than 1,500 tons and a speed of 12 knots. This law is still in force, so far as it does not conflict with later acts. The requirement is that contracts be let to the lowest bidder qualified to perform them.

The act of 1936 vested in a commission the duties and functions of the old United States Shipping Board and set the broad lines of a shipping policy for the United States. The commission made a survey of the merchant marine and adopted a long-range program for replacements and additions to the American merchant fleet. In 1938 the commission contracted for the construction of 58 ships and projected the construction of 500 ships in the next ten years. Late in 1938 a new express and de luxe liner service between New York and the three republics of Brazil, Uruguay and Argentina was inaugurated and construction was begun on three passenger vessels for a trans-Pacific service. All ocean mail contracts in existence on June 30, 1937 were terminated and temporary operating-differential subsidy agreements were entered into with 16 steamship companies.

In 1948 two types of subsidies were in force: (1) the construction-differential subsidy, and (2) the operating-differential subsidy.

Under the first-mentioned the Maritime Commission is empowered to aid a citizen of the United States in the construction of a new vessel to be used on a service, route, or line in the foreign commerce of the United States, determined to be essential, by having the vessel constructed in a shipyard in the United States, to pay such construction costs, and to sell the vessel to the applicant for an amount equal to the estimated cost of the construction of the vessel if it were built in a foreign shipyard. The difference between the cost of constructing the vessel in the United States and the estimated cost of its construction in a foreign shipyard is termed a construction-differential subsidy; but in no case may such subsidy exceed 50 per cent of the cost of the vessel.

Under the operating-differential subsidy the commission is empowered to grant an operating-differential subsidy to aid a citizen of the United States in the operation of an essential service, route, or line in the foreign commerce of the United States. This subsidy, which is intended to place the proposed operations of such vessels on a parity with those of foreign competitors, is the excess of the cost of items of operating expense in which it is found that the applicant is at a substantial disadvantage in competing with foreign vessels over the cost of such items if the vessel were operated under registry of a foreign country whose vessels are substantial competitors of the vessels covered by the contract. See also UNITED STATES—NEW FEDERAL AGENCIES, *Maritime Commission, United States.*

SHIPPING OF THE WORLD. When World War I broke out in 1914, the world's shipping had reached its greatest known proportions. The year 1913 had been a record year in shipbuilding with nearly all the maritime nations. Great Britain had launched 641 steamers aggregating 1,919,578 tons and 47 sailing vessels aggregating 12,575 tons, the highest figure ever recorded for a year's output of tonnage in that country. Not all of this tonnage went to swell the numbers of the British fleet. Holland bought 89,992 tons; Norway, 54,111 tons; Greece, 39,999 tons; the British colonies, 37,118 tons, and Russia, 31,217 tons. With the exception of the United States, whose output of shipping for the year fell short of her 1912 figures by some 8,000 tons (due to a decrease of 42,000 tons in the yards of the Great Lakes), and slight decreases from previous record figures in France and Japan, all the other shipbuilding countries made substantial gains over their previous records. During 1913, then, the new ships launched had added 3,188,578 tons in steamers and 144,304 tons in sailing vessels to the world's grand fleet. The previous high record had been 2,919,763 tons (steam and sail combined) in 1906, and the average yearly addition to the world's fleet for 20 years past had been 2,341,500 tons. However, the yearly additions were not all clear gain. The losses in 1913 from collision, burning, foundering, wrecks, missing and abandonment at sea, together with those of vessels broken up as unseaworthy, amounted to 499,000 tons of steam vessels and 183,000 tons of sailing vessels, so that the net addition to the world's shipping in 1913 was 2,690,000 tons of steamers, and there was a net loss of 39,000 tons of sailing craft. This figure was very small by comparison with the losses of other years. In 1910 the tonnage lost amounted to 947,690 tons, and the average annual loss for 20 years had been 765,000 tons.

For a long period of years the tendency in the world's grand fleet has been an increase of steam vessels and a decrease of sailing vessels. The one exception has been Finland, whose persistent building of sailing ships long prevented any notable decrease in the sailing tonnage in Russia's shipping. Norway's sailing tonnage has been declining since 1890; Sweden's since 1880;

Denmark's since 1880; Germany's since 1880; Holland's since 1860; France's since 1860; Italy's since 1870; Austria-Hungary's since 1870; Greece's since 1870. In the case of the United Kingdom the date was 1870 and for the United States 1861. Not to go farther back than 1900, the percentage of sailing vessels in the world's grand fleet was 23 per cent; in 1915 it had fallen to 7 per cent.

The world's shipping on June 30, 1914, as recorded by the French Bureau Veritas, totaled 17,135 steamers of 100 tons or over, aggregating 23,840,675 net tons; and 21,924 sailing vessels of 50 tons and upward, aggregating 5,629,942 net tons: a grand total of 29,470,637 net tons—also recorded as 45,273,783 gross tons, a figure also of no small importance, as the sinkings by submarines are reported on the basis of the gross tonnage; the net tonnage being the vital figure in the carrying capacity of the grand fleet.

Table A, showing the distribution of 99.7 per cent of the world's grand fleet, was compiled from the records of the Bureau Veritas. The 26 countries named are arranged in the order of their steam tonnage. Only steam vessels of 100 net tons and over and only the sailing vessels of 50 net tons and upward have been counted. Many highly interesting facts appear from the figures in the table, among them the very large tonnage in sailing vessels, both actual and comparative, owned in the United States in the year cited. Though Great Britain shows a much larger number of such craft, their tonnage averages only 190 tons as against 420 tons for the United States vessels. Norway's sailing fleet is notable in showing the largest average tonnage in the table —750 tons; Belgium following with 730 tons and Peru third on that score, with 540 tons. The largest average tonnage for steam vessels is shown by Germany—1,880 tons; followed by Austria-Hungary, 1,800 tons; Netherlands, 1,740 tons, and Great Britain, 1,640 tons.

TABLE A.—SHIPPING OF PRINCIPAL NATIONS, JUNE 30, 1914.

	Steam vessels		Sailing vessels	
	Number	Net tonnage	Number	Net tonnage
Great Britain	6,594	10,785,503	4,945	935,467
Germany	1,510	2,852,797	1,041	426,919
United States	1,103	1,481,849	2,993	1,214,974
Norway	1,266	1,108,504	861	600,714
France	692	1,013,847	877	434,289
Japan	803	953,117	1,308	167,119
Italy	537	786,234	934	279,366
Netherlands	451	782,663	419	48,069
Sweden	940	641,347	1,117	162,289
Austria-Hungary	345	615,554	127	11,538
Russia	622	543,475	3,412	559,914
Spain	438	510,000	249	30,897
Greece	342	448,857	808	142,585
Denmark	470	429,337	615	78,514
Belgium	132	203,311	16	11,639
Brazil	257	174,295	303	67,791
Argentine Republic	147	98,571	175	52,277
Turkey	96	67,637	985	208,751
China	66	65,045	2	439
Chile	66	60,694	82	47,954
Portugal	61	51,531	252	42,413
Cuba	41	34,969	113	11,095
Uruguay	30	26,247	56	24,632
Rumania	22	26,194	22	3,567
Mexico	30	22,095	47	8,512
Peru	12	17,370	58	31,390

With the breaking out of the war in July 1914 the destruction by war vessels of the merchant fleets of the belligerents began, and this destruction on the part of Germany and her allies was soon extended to include the shipping of neutrals carrying contraband, few attempts being made to capture them. In February 1917 the German government declared promiscuous war on all merchant vessels of whatever country found in certain specified areas of the open sea. This condition had already prevailed in some waters for several months previous to the declaration, and many vessels were sunk outside of the forbidden areas, and even those bearing safe conduct from Germany and in the so-called "safe" channels met the same fate.

Lloyd's Register of Shipping, in its edition for 1919–1920, made what is undoubtedly the most complete compilation of tonnage for the years 1914 and 1919, for the purpose of showing the losses in shipping during World War I years. The results are shown in Table B reproduced below. The *Register* also undertook to estimate the position of the world's tonnage as if there had been no war. It calculated the normal increase in tonnage for all the maritime countries by employing the same ratios of increase that had prevailed for several years prior to 1914. The result of these computations was the estimate that during the period 1914–1919 the British mercantile marine had lost 5,202,000 tons, and that the other nations, with the exception of the United States, had lost 9,000,000 tons, making a total loss of 14,202,000 tons. As a partial compensation, the United States had gained 6,729,000 tons, making a net loss in world tonnage of 7,473,000 tons. Germany's loss is given as 3,582,000 tons. Germany's 1919 tonnage shown in Table B includes all vessels which, at the date of the armistice, had not been captured or requisitioned by other countries. Among the neutral countries Norway was the greatest sufferer, losing 677,000 tons, while Italy lost 536,000 tons.

As a result of its researches, the *Register* estimated that the world had lost through the war 8,500,000 gross tons of shipping, representing a dead-weight carrying capacity of 12,500,000 tons. But recovery from these losses was swift. From June 1919 to June 1920 the total tonnage of the world rose from 47,897,000 to 53,905,000 tons.

TABLE B.—SHIPPING LOSSES DURING WORLD WAR I

COUNTRY	1914 1,000 gross tons	1919 1,000 gross tons	Difference, 1,000 gross tons
United Kingdom	18,892	16,345	−2,547
British Dominions	1,632	1,863	+231
United States	4,287	11,933	+7,746
Austria-Hungary	1,052	713	−100
Denmark	770	631	−339
France	1,922	1,962	+40
Germany	5,135	3,247	−1,888
Greece	821	291	−530
Holland	1,472	1,574	+102
Italy	1,430	1,238	−192
Japan	1,708	2,325	+617
Norway	1,957	1,597	−360
Spain	884	709	+375
Sweden	1,015	917	−98
Others	2,427	2,552	+125
Total	45,404	47,897	+2,493

Table C, compiled from the 1947–1948 and earlier editions of *Lloyd's Register,* shows the accelerated growth of tonnage caused by abnormal demands for cargo vessels by the Allied

TABLE C.—COMPARATIVE GROSS TONNAGE OF PRINCIPAL MARITIME NATIONS IN 1914, 1921, 1938, AND 1947.

Country	1914	1921	1938	1947
British Empire [1]	20,523,706	21,588,606	20,719,090	21,321,639
United States [2]	4,286,349	15,746,384	11,515,258	32,423,196
Denmark	770,430	883,052	1,129,556	1,024,292
France	1,922,286	3,298,795	2,880,783	2,314,898
Germany	5,134,720	654,407	4,231,657	591,442
Holland	1,471,719	2,208,433	2,852,012	2,436,385
Italy	1,430,475	2,467,537	3,258,992	1,300,987
Japan	1,708,386	3,354,806	5,006,712	5,808,832 [3]
Norway	1,957,353	2,371,051	4,613,175	3,760,941
Spain	883,926	1,111,563	947,963	1,130,004
Sweden	1,015,364	1,085,984	1,571,054	1,828,516
Others	4,299,163	4,075,707	8,143,899	9,572,640
Total steam and motor tonnage	45,403,877	58,846,325	66,870,151	83,513,772
Sailing and barge	3,685,675	3,128,328	976,360	842,458
Grand Total	49,089,552	61,974,653	67,846,511	84,356,257

[1] Includes Canadian lake tonnage. [2] Includes lake tonnage. [3] Includes tonnage sunk in World War II.

powers during two world wars, and the relatively slow increase during the intervening period when British, French and American tonnages declined, while German, Japanese and Norwegian tonnages showed phenomenal gains. The *Register* cautions that the total world tonnage shown for 1947 as 84,356,257 tons, indicating an increase of 16,509,746 since 1938, should be considered with reservations: Japan's tonnage figure for that year takes no account of shipping destroyed during World War II which, in 1947, was estimated as possibly in excess of 4,000,000 tons.

The total tonnage of the USSR (steamers, motor ships, sailing vessels and barges) was estimated in 1947 at 2,164,467, considerably less than that of France.

TABLE D.—NUMBER AND GROSS TONNAGE OF MERCHANT VESSELS OF 100 GROSS TONS AND UPWARD LAUNCHED IN PRINCIPAL NATIONS.

Country	1938		1946	
	No.	Tons	No.	Tons
United Kingdom [1]	267	1,030,375	371	1,133,245
United States	105	201,251	96	501,294
Belgium	21	30,197	13	17,451
Denmark	35	158,430	13	39,051
France	7	47,290	20	23,205 [2]
Germany	193	480,797	No	returns
Holland	142	239,845	23	33,290
Italy	13	93,503	57	61,742
Japan	146	441,720	No	returns
Norway	42	54,645	20	34,428
Spain	—	—	17	41,289
Sweden	40	166,464	50	146,875
Others	47	58,967	2	9,900

[1] Includes Northern Ireland. [2] Returns not completed.

The total tonnage of merchant vessels of 100 gross tons and upward launched in 1946, computed from the above Table D, amounts to 2,041,770 tons. However, the *Register* elsewhere gives a figure for "gross tonnage launched in 1946" of 2,127,421 tons, some 85,651 tons more than the tonnage listed in the table.

In the comparison between launchings in the last peace year before World War II and the first peace year since that conflict, it will be noticed that Great Britain and the United States were the only countries which showed an increase of tonnage in the postwar year.

SHIPS, Registration of. See MARITIME LAW.

SHIPS THAT PASS IN THE NIGHT, the title of a widely read story by Beatrice Harraden. It achieved notoriety when it was published in 1894 to some extent, very possibly on account of its taking title. The scene is laid in a Swiss winter resort for consumptives.

SHIPTON, shĭp'tŏn, **Mother,** an English prophetess about whose existence there seems to be no certainty, while there is no doubt that many of the sayings attributed to her were fabricated by others. According to S. Baker, who published Mother Shipton's pretended prophecies in 1797, she was born near Knaresborough, Yorkshire, in July 1488, and baptized as Ursula Southiel. She died, according to the same authority, at over 70 years of age, but it was not until 1641 that a pamphlet appeared containing some of her alleged predictions. In 1645 all her prophecies were considered as having been fulfilled. In 1862, a prediction was made, with Mother Shipton's name appended to it, that the world would come to an end in 1881.

SHIPWORM. See TEREDO.

SHIPWRECKS. See DISASTERS OF THE WORLD, NOTABLE.

SHIR ALI KHAN, shēr ä'lē khän, Amir of Afghanistan: b. about 1825; d. Mazar-i-Sherif, Feb. 21, 1879. He was the youngest son by a favorite wife of Dost Mohammed and was nominated successor to the throne to the exclusion of Mohammed Afzal Khan, the eldest son by another wife. Dost Mohammed died in 1863 and a fratricidal war ensued to determine the succession. In December 1863 Shir Ali secured the recognition of the British government to his succession, and in the contest that followed Mohammed Afzal was taken prisoner. The brother and son of the latter, who retained possession of Afghan-Turkestan, renewed the war, and in a battle which took place in May 1866 the majority of Shir Ali's troops deserted to the enemy. For the next three years Shir Ali's fortunes ebbed and flowed and at times he seemed likely to lose his throne forever. In 1869, however, with the recognition of the British he was fully established

on the throne at Kabul. In 1877 he became estranged from the British government, and refused to receive a British mission at Kabul. At the same time he made overtures to Russia and received her mission, while relations between Russia and Great Britain were strained. The British mission being a second time repulsed, war was declared and the British invaded Afghanistan. Shir Ali fled at the approach of the British and determined upon making personal appeal at Petrograd for an alliance against the British. The Russian government sent him messages declining to enter into any such alliance, but he persisted in his journey until he had crossed the Russian frontier, where he died suddenly. See AFGHANISTAN.

SHIRAS, shī'ras, **George, Jr.,** American jurist: b. Pittsburgh, Pa., Jan. 26, 1832. He was graduated from Yale in 1853 and from the Yale Law School the next year; received the degree of LL.D. from Yale in 1883. Admitted to the bar in his native city in 1856, he practiced there until he was appointed associate justice of the United States Supreme Court in July 1892. He retired March 1, 1903 on age limit, and died at Pittsburgh, Aug. 2, 1924.

SHIRATORI, shē-rä-tō-rē, **Toshio,** Japanese diplomat: b. Japan, 1887. A graduate of Tokyo Imperial University (1914), he entered the Foreign Office, was minister to Scandinavia and Finland (1933–1936), ambassador to Italy (1938–1942), then became a member of Japan's national council. He was known for his extreme Fascist sympathies on the eve of World War II.

SHIRAZ, shē'räz, Iran, capital of the province of Fars, lies in a high valley, 220 miles southwest of Isfahan, and is reached by lofty passes. It lies in a broad plain, 115 miles east-northeast of Bushire and 35 miles southwest of the ancient Persepolis, the ruins of which still exist. Its nearest point is Kodijan. It is much praised in Persian poetry for its climate, its wine and rose gardens. The city, with thousands of the inhabitants, was nearly destroyed for the third time in its history in 1853 by earthquake. The town now rebuilt contains mosques, a bazaar, but nothing noteworthy; the suburbs are more attractive. At the north are the tombs of the celebrated poets Hafiz and Sadi, both natives of the town. It is a center of trade, due to its position on the commercial routes leading from the port of Bushire. Shirâz is famous for its wines and inlaid work of wood and metals. It has extensive manufactures of silk and cotton, firearms, silverwork, pottery, rugs, etc. Pop. 129,000.

SHIRE, shē'rā, East Africa, a river in the southeastern part of the continent. It rises in Lake Nyasa, and, after a course of 370 miles, flows into the Zambezi. It is navigable except where interrupted for 70 miles by the Murchison Falls and Rapids, which have a fall of 1,200 feet. It flows through a rich agricultural country and, until railroads were completed in the 1930's, was an important commercial route to the lakes region. The Shiré Highlands are included in Nyasaland. There are several Scotch and English missions and settlements in the Shiré country. Cotton and grain are the chief products. The Shiré was explored by Livingstone (1858–1863), and the district was annexed as British territory in 1889. See also NYASA.

SHIRE, shēr or shīr, in the United States the more modern term *county* replaces this older name. Shire is an English term, still in general use in England, Wales and Scotland, although superseded by the modern form in most places; thus Derbyshire, Glamorganshire and Renfrewshire are "counties." In the United States counties are the first division of the state and township the next. The use of the word shire in the United States has no significance as to division; it is merely a portion of a name. Thus we have the "county of Yorkshire." But in England this is different; the suffix "shire" so used is in itself an indication that the division is a county.

It has been said that at different periods England was divided into shires. However, it is probable that all such statements are incorrect, and that although there exists in England a system of subdivisions known as shires, the country perhaps never was consciously so divided. If it be remembered that the Saxon people were a collection of clans and that these clans were divided into families, two or three large families to the clan, the seeming inconsistency of the above statement is explained. The head of the family was the supreme lawgiver in the family. He himself was under the leadership of the head of the clan, or tribal community. These tribal communities united to form what is known as hundreds, and the hundreds united to form shires. Thus the country instead of being divided into shires was formed by the union of many separate shires, each of which was, practically, an independent kingdom. Some of these small districts still exist—Norhamshire in Northumberland and Richmondshire in Yorkshire. It was after this union of shires under one national head, not a spontaneous process, but one of slow and at times retrogradal growth, that the shire took its position as a subordinate part of the kingdom. As such it had at its head the shire-reeves, whence the modern sheriff. The shire-reeve preceding the Norman Conquest was one of the two heads of the shire organizations, the other being the ealdorman (or earl), whence comes our modern alderman. The ealdorman seemed to represent the old organization and dignity of the shire when it was an independent kingdom; he shared certain offices with the bishop. But the shire-reeve was more particularly the representative of the king, and after the Norman Conquest he became purely a royal officer, with his importance considerably curtailed. He held the sheriff's tourn, an annual court to which came the vassals of the king. The appeal from this court was to the king himself, and from this appeal came the growth of the King's Court, in its three branches of King's Bench, Common Pleas and Exchequer. This court assessed taxes, also, and thus the sheriff became the financial head of the shire; to the Sheriff's Court, too, fell the election of knights of the shire, thus giving it the function of an assembly for the choice of shire representatives. From the time of the Plantagenet accession to the throne the importance of the shire organization decreased, the sheriff now being merely an aid to the county court (q.v.). (See COUNTY; FEUDAL SYSTEM). Consult Oman, Sir Charles, *England Before the Norman Conquest,* 5th ed. (1923); Jolliffe, J. E. A., *Constitutional History of Medieval England* (1937); Stenton, Frank Merry, *Anglo-Saxon England* (1943, 1947); Sayles, G. O., *The Medieval Foundations of England* (1948).

SHIRLAW, shĕr'lâ, **Walter,** American painter: b. Paisley, Scotland, 6 Aug. 1838; d. Madrid, 1909. He was brought to the United States in his second year, and began his artistic career in early manhood as a bank-note engraver. He exhibited for the first time in the National Academy of Design in 1861. After a course of seven years' study in Munich (1870–78) he adopted genre-painting as his specialty, and also accomplished a great deal of work in decoration and book and magazine illustration. He was one of the founders and the first president of the Society of American Artists, and in 1888 he became a National Academician. A memorial exhibition of 200 of his works was held in New York and other cities in 1911.

SHIRLEY, shĕr'lĭ, **James,** English dramatist: b. London, 18 Sept. 1596; d. there, 29 Oct. 1666. He was educated at Oxford and Cambridge, and, having taken holy orders, obtained a curacy near Saint Albans. He soon afterward went over to the Church of Rome. Then he removed to London, became a writer for the stage and acquired a reputation which caused him to be taken into the service of Queen Henrietta Maria. His first comedy was licensed in 1625, and from that date he produced many plays in rapid succession. In 1636 he went to Ireland to assist Ogilby in the management of the new theatre at Dublin. After his return, probably early in 1640, he wrote much, and was conceded the foremost of English playwrights. He died of exposure during the great fire. He was last of the notable series of Elizabethan and Jacobean playwrights; and his works, while frequently thin in plot and loosely constructed, are clever, suave and abounding in fancy. Besides 37 tragedies and comedies, he published a volume of poems. His best dramas are the tragedies 'The Traitor,' 'The Royal Master' and 'The Cardinal,' and the comedies 'Hyde Park,' 'The Ball,' 'The Gamester' and 'The Imposture.' The best edition of his dramatic works is that by Gifford and Dyce (1833). Consult Wood, 'Athenæ Oxonienses,' (ed. Bliss; 1817); Ward, 'History of English Dramatic Literature' (1875); Forsythe, R. S., 'Relations of Shirley's Plays to the Elizabethan Drama' (New York 1914); Nason, A. H., 'James Shirley, Dramatist: A Biographical and Critical Study' (New York 1915); Parlin, H. T., 'A Study in Shirley's Comedies of London Life' (University of Texas 1914).

SHIRLEY, William, American colonial governor: b. Preston, Sussex, 1693; d. Roxbury, Mass., 24 March 1771. He studied law and in 1731 came to America, settled in Boston, Mass., and there engaged in that profession. He was royal governor of Massachusetts in 1741–45, planned the successful expedition against Cape Breton in 1745, and in 1745–53 was in England, after which he returned to Massachusetts as governor. He made a treaty with the Eastern Indians in 1754, explored the Kennebec River, and erected several forts on its banks, and at the outbreak of the French War in 1755 was commander-in-chief of the British forces in North America. He planned the expedition of General Prideaux against Niagara and accompanied it as far as Oswego, but was superseded in his military command and in his governorship in 1756. He was later appointed governor of the Bahamas, a post he resigned in 1770, and then returned to Massachusetts, where he lived in retirement the remainder of his life. He wrote 'Electra,' a tragedy; 'Bertha,' a masque; 'The Siege of Louisburg' (1745); 'Conduct of Gen. William Shirley Briefly Stated' (1758), etc. Consult 'Correspondence of William Shirley' (New York 1912).

SHIRLEY, a novel by Charlotte Brontë, published in 1849. The scene is laid in the Yorkshire country, with which the author had been acquainted from childhood. The heroine, Shirley, was drawn from her own sister Emily. The book is richer in portrayal of character than in striking incident.

SHIRREFF, shĭr'ĕf, **Emily Anne Eliza,** English pioneer educator of women: b. 3 Nov. 1814; d. London, 20 March 1897. She was a daughter of Rear-Admiral Shirreff and with her sister Maria — afterward Mrs. William Grey — received an excellent education, especially in languages and history. The inadequacy of educational facilities for women impressed the sisters deeply and their first efforts to improve matters lay through the publication of several books of which they were joint authors. These include 'Letters from Spain and Barbary' (1835 or 1836); 'Passion and Principle,' a novel (1841); 'Thoughts on Self-Culture, Addressed to Women' (1850). Miss Shirreff was a staunch supporter of the movement to establish Girton College, and was honorary mistress there in 1870, as well as being a member of the executive committee until her death. With her sister she founded the National Union for Improving the Education of Women of all Classes out of which in 1877 came the college for women now known as the Maria Grey Training College. She was an advocate of the Froebel system, concerning which she wrote several pamphlets. She was also author of 'Intellectual Education and its Influence on the Character and Happiness of Women' (1858).

SHISHAK, shī'shăk, Egyptian king, the Sheshenk I of the monuments, and the first sovereign of the Bubastite or Libyan dynasty. Shishak I rose to the throne from being commander of the powerful Libyan mercenaries; to him Jeroboam fled for protection when he fell under the suspicion of Solomon (1 Kings xi, 40); and in the fifth year of Rehoboam he invaded Judah, whose fenced cities he took one after another until he arrived at Jerusalem which, according to the statements of Josephus, fell without a struggle. (Compare 2 Chron. xiii, 1–10). Shishak pillaged the temple and the king's palace, carrying off the treasures accumulated in the reigns of Solomon and David, and reducing Judah to the position of a tributary kingdom. He ascended the throne of Egypt about 980 B.C. and reigned at least 21 years. On the southern wall of the great temple of Karnak, in Upper Egypt, is a record of the conquests of Shishak and of the countries ruled by him. On this are four rows of prisoners. Each figure has his arms tied behind him, and a rope around his neck, and Shishak, a colossal figure, leads them by a string, meanwhile branishing a weapon. In the lists of his conquests during the expedition in which Judah was subjected to his rule we find the names of cities in both the kingdoms of

Israel and Judah and of several Arabian tribes to the south of Palestine. Among those of the cities which can be recognized in these lists are Rabboth, Taanach, Sunem, Rehob, Hapharaim Adoraim, Mahanaim, Gibeon, Beth-Horon, Kedemoth, Ajalon, Megiddo and Judah Maluk, "the royal city of Judah," or Jerusalem. A stele commemorating his invasion of Palestine and capture of Jerusalem was found on the plain of Esdraelon in 1926. All Egypt was under his sway. Consult Müller, W. M., 'Egyptological Researches' (Washington 1906).

SHITTIM WOOD. See KITTIM.

SHIVAISM, the religion of the Shivaites, or worshippers of Shiva or Siva, an ancient Dravidian divinity of southern India. His proper name was Mahâdêwa, "greater god"; but the title Shiva, "the good," was more generally applied to him by his votaries. While Shiva is the most popular of the Hindu pantheon, his worship more widely obtains in the south than in the north, although his throne is the Himalayas, and he is a destroying god, yet sometimes restoring and fructifying in influence. Thus in the south he is widely honored under the symbol of the phallus or lingam. Although he is a Dravidian god, in the struggle between Brahmanism and Buddhism he was adopted into the Brahmanistic system and identified with the Vedic Rudra, god of storms. Consult Barnett, L. D., 'Antiquities of India' (London 1913); Hopkins, E. W., 'Religions of India' (Boston 1895); Macdonnell, A. A., 'Vedic Mythology' (Strassburg 1898).

SHIVELY, Benjamin Franklin, American lawyer and senator; b. Saint Joseph County, Ind., 20 March 1857; d. 14 March 1916. He was graduated at the University of Michigan in 1886, and engaged in law practice at South Bend, Ind. He served in Congress in 1884–85 and in 1887–93. He was elected to the United States Senate for the term 1909–15 but died before its expiration.

SHOA, Italian East Africa, an important southern division of Ethiopia, before 1889 a separate kingdom, with ill-defined boundaries. It consists of a series of plateaus at 3,000 feet above sea-level, traversed by mountain chains, which, in the culminating point, Mount Metatite, near Ankobar, have a height of 10,700 feet. Its east portion, called Effat, has a less elevated and more generally sloping surface, which is highly cultivated, and yields good crops of grain, chiefly wheat and barley. Cotton also is extensively cultivated. The higher plateaus are devoted to pasture. Among indigenous trees is the *Juniperus excelsa,* which in the course of a century attains a height of 160 feet, with a diameter at the base of four to five feet. The exports of the province comprise grain and large quantities of a durable cotton cloth, and to these may be added, as articles of trade, coffee, gold-dust, ivory, gums and spices, ostrich feathers, hides, dye-woods, medicinal plants, etc. It contains Addis Ababa, capital of Ethiopia; and the chief city, Ankobar. Christianity was introduced as early as the 3d century, and is still professed by a large number of the inhabitants, though in a degenerate form. Pop. estimated at 2,500,000 of whom about 1,000,000 are Christians and the rest chiefly Mohammedans.

SHOALS, Isles of. See ISLES OF SHOALS.

SHOCK, a sudden vital depression of the body usually due to sudden derangement of the functions of the nervous system, and generally accompanied by a dilatation of the blood-vessels of the surface of the body and a marked decrease in blood-pressure. Such a condition may be brought about by both physically or psychically acting causes. A blow, a fall, a hæmorrhage, an operation, sudden fright, an appalling sight, a heartrending cry, sudden financial loss or great and sudden bereavement are among the many causes constantly acting to bring about such a condition. The symptoms of shock vary greatly according to the type of cause and the individuality of the patient. Sometimes the symptoms begin at once; under other circumstances the results may be delayed for a long period. A very severe form of shock is spoken of as surgical shock. This usually results from serious operations which involve nervous structures, take much time, and large quantities of anæsthetic. A condition closely resembling surgical shock may follow the severe hæmorrhage of placenta prævia, ectopic pregnancy, or other form of internal hæmorrhage. (See BLEEDING). Special types of shock develop from the violent action of heavy explosions in war. These affect the central nervous system and were extremely frequent in the Great War of 1914–18. The symptoms of shock are very characteristic. The face usually becomes blanched and pale, the body becomes cold and is covered with clammy perspiration, the hands and feet usually become icy, the brain seems to be in a whirl, and consciousness is lost or much clouded. The pulse is usually quickened; the arteries at the wrist are soft and easily compressed; the breathing is usually rapid and shallow, labored, and at times irregular. The eyes are often sunken and listless, and the temperature of the body is diminished one or two degrees. The most important single factor in pure shock of the type described is the sudden fall in blood-pressure. This is thought to be due to purely nervous causes, the most potent one of which is paralysis of the sympathetic nervous fibres. This causes sudden dilatation of the blood-vessels, loss of tone of the vessel-walls, with loss of blood-pressure; hence the symptoms, and oftentimes the resultant death. The action in the sympathetic nervous system is largely due to the implication of the suprarenal glands, and other glands of internal secretion. Sometimes the symptoms of shock are much less severe. There is temporary faintness, slight pallor and a feeling of nausea, and the attack passes off. Between this slight shock and the shock that results from the pugilist's "solar-plexus" blow, that may bring death, every variety of change may be noted. In severe accidents many patients, while not suffering from physical injury, are often prostrated and develop true railroad shock, or traumatic neurasthenia. (See NEURASTHENIA). Psychical shock may induce neurasthenia; it may be a potent cause of mental disease; or it may even cause death. The influence of shock upon pregnant women is of great importance. Shock in such circumstances may bring about miscarriage, or cause malformations of the fœtus. Mild cases of shock are recovered from without aid. A stage of reaction sets in, the patient becomes warmer, the blood-vessels

regain their tone, and equilibrium is restored. More severe attacks require hot-water applications to the extremities, hot tea or coffee by mouth, alcoholic stimulants, or even ergot or adrenalin. Massage and heat, and sometimes rectal injections of plain hot (110°–115° F.) water, or hot salt water (1 teaspoonful of salt to pint of water) are very useful in extreme cases.

SHOCK ABSORBERS. Even when vehicle springs have been carefully selected with due regard to the loads they are to carry, it is difficult to provide against the many variations in loads and speed that necessarily obtain under conditions of actual service. In automobiles especially it is found that a car which rides easily on good roads often proves decidedly uncomfortable on rough roads because the light springs cause the riders to be jostled about at any but the slowest rate of speed. To aid the springs and effect a compromise, shock absorbers have been devised. They are of various designs and are all intended to supplement the action of the vehicle springs. Two general divisions of absorbers may be noted, however, those which receive shocks caused by a sudden deflection of the spring and those which merely check excessive motion of the spring by what may be considered a variety of brake action. A very simple form of absorber is a rubber pad carried by a clip and attached at the centre of the spring, where on the chassis is fixed a bolt or bracket which, upon the sudden deflection of the spring, rests the frame and load upon the rubber buffer or pad. Another form of absorber is the auxiliary spring, usually a spiral, and designed to operate in conjunction with the main springs. Its function is to retard excessive motion of the latter. Absorbers of the brake action type consist usually of a pair of levers hinged together at one end and the other end attached to chassis and spring, respectively. A variety of this form has a cup and cam hinge, with steel springs inserted in the cup and pushing against the cam. Other designs of absorber consist of cylinders filled with oil and fitted with a piston and plunger rod. One member of these cylinder absorbers is of course attached to the frame or chassis while the other is attached to the axle. The piston acts as a check to any rapid movement of the plunger rod.

SHOE. See BOOTS AND SHOES; SHOE INDUSTRY IN THE UNITED STATES.

SHOE-BILLED STORK, or **WHALE-HEAD,** a large stork (*Balæniceps rex*) found on the White Nile. It is brownish-gray with black wings, tail and feet, the head is slightly crested, the bill short, broad and deep, with the tip hooked and mottled dusky and yellow. These birds, also known as "boat-bills," live in flocks in swampy woods and morasses, and feed upon all kinds of small reptiles, frogs, fish, mollusks and carrion. Although they perch upon trees, the nest is on the ground, a slight lining of grass, etc., in a slight hollow. The eggs are white and from 2 to 10 in number.

SHOE INDUSTRY IN THE UNITED STATES. History.— Shoes were brought to America by the first settlers, as part of their equipment. The Indians wore moccasins, and the white men adopted them until Thomas Beard, a shoemaker of Saint Martin's lane, London, came to Massachusetts Bay colony in 1629, bringing a supply of leather as well as a kit of tools, and became the first shoemaker on record in the colonies. As the colonies grew, other shoemakers came, and Johnson, in his 'Wonder Working Providence,' speaks of the shoe trade in 1654 as among the industries "enriching themselves very much." Many early settlers, being jacks of all trades, made their own shoes. Some raised the cattle and tanned the leather, of which their shoes were made. In New England, shoemakers tramped from settlement to settlement, making and mending shoes, and accepting board and lodging as part pay. In the larger towns, shoemakers set up regular shops. The shoemakers "inhabiting and housekeeping in Boston" were authorized to incorporate by the General Court of the Bay colony, and to enforce rules for the good of their trade. However, the Court provided that there should be no unlawful combination "for enhancing the prices of shoes or wages whereby the people suffer." The Court also provided that no butcher should make leather, that no tanner should make shoes and that no shoemaker should tan leather. It forbade the use of false and deceitful mixtures in making leather. Also it forbade the wearing of extravagant styles in footwear by persons of mean estate. Government regulation of the footwear industry during the war 1914–18 was mild compared to the government regulation during colonial times. The shoe industry flourished, as the colonies grew. But it was not strong enough to provide footwear for the soldiers of the Revolution, and Washington's troops left the bloody footprints of their bare feet in the snows of Valley Forge. John Adam Dagyr, a soldier of the Revolution, and a shoemaker, too, imported fine shoes from London and Paris, and studied them until he learned how to make shoes as good. He freely taught his skill to others. The newspapers spoke of him as "The Celebrated Shoemaker of Essex." They advised their readers to buy fine shoes made in America, instead of importing them from London and Paris.

After the Revolution, Congress put a protective tariff on shoes, and the tariff, with varying rates of duty, was kept in force until the present time when the duty on shoes is relatively high. The early 19th century was a golden era in the shoe industry. Shoemakers worked in little shops by their homes. The shops were called "ten footers" because they were 10 feet square. One of them is a permanent exhibit at the Essex Institute in Salem. The shoemakers read as they worked, or talked with visitors. Roger Sherman, a United States senator, who "never said foolish word," got his education by studying from books opened by his side as he made shoes. Henry Wilson, "The Natick Cobbler" who became Vice-President, got his first lessons in debate by discussing topics of the day with visitors at his little shop in Natick, Mass. Often, the minister was a Monday morning visitor at the shoe shop, and the Sunday sermon was discussed. A Bible was kept in many a shop. In large shops, the shoemakers often sang together. In small towns, men farmed in summer and made shoes in winter. Manufacturers of the cities sent cases of shoes in express wagons to the farmer shoemakers.

The kit of shoemakers of hand method days

consisted of a lapstone, a flat face hammer, awls, waxed ends, knives, rub sticks, a piece of sharkskin, used as is sandpaper today for buffing leather, and a bottle of blacking and other small equipment. Each shoemaker had his own kit of tools and "seat" on which he worked and kept his tools by his side. Some used their tools and seats for a lifetime. The pay was small and the employment irregular. A dollar a day was high pay. At one period, in Lynn, shoemakers were paid in orders on the union store, exchanging their orders each Saturday for flour, molasses, salt fish and other necessities. The uppers of many shoes were stitched by women who worked at home. "Binding shoes" this was called, and Lucy Larcom pictured it in her poem *Hannah at the Window Binding Shoes.*

The change from hand to machine methods in shoemaking makes a marvelous chapter in American industrial history. Thomas Blanchard (1788–1864), a Yankee mechanical genius, was challenged to make a machine to turn gun stocks. He did it. The machine was adapted to making shoe lasts. So it became possible to make thousands of lasts by machinery, where only one could be made by hand. The lasts were refined, and multiplied in style, and standardized in sizes, until there are the thousand and one varieties of today. Elias Howe (1819–1867), a struggling young machinist, invented the sewing machine. John Brooks Nichols, a Lynn shoemaker, adapted it to the sewing of uppers of shoes. Women ceased to "bind shoes" at home, or sew the uppers with needle and thread in hand.

Lyman Reed Blake (1835–1883), a South Abington, Mass., shoemaker, invented the McKay machine for sewing soles of shoes just before the Civil War. He worked on it nights, after doing a day's work in the factory. He realized that he didn't have the business ability to put his machine on the market. So he sold it for $70,000 to Col. Gordon McKay (1821–1903). When Blake asked Congress for an extension of his patents, he estimated that his machine had saved to the shoe trade $13,979,724.30.

This McKay machine revolutionized the shoe industry. The shoemakers who worked by hand in little shops at home could not compete against the machine. Factories were established and equipped with machinery. Shoemakers came from little shops to work in the factories. Machinery was invented and developed to supplement the McKay machine for sewing soles and for stitching uppers. One by one the hand workers gave place to the machine operators. Sixty different kinds of machines are used in an average factory at present, and one factory has 137 different kinds of machines which it uses in making a single pair of shoes.

Sidney W. Winslow (1854–1917), and others consolidated the several important shoe machinery companies into the United Shoe Machinery Company in 1899. It established a system of leasing machinery. Manufacturers pay so much royalty for each pair of shoes made on its chief machines. They buy outright the supplementary machines, which are used in preparing a shoe for the chief machine, such as a welt sewing machine, or to finish the shoe after it is sewed. The company has its machines in 98 per cent of the shoe shops of the country. It has strong branches abroad, in Europe, South America, Australia, and even in Asia and Africa.

In 1917 the company became the United Shoe Machinery Corporation, and expanded its activities by undertaking the manufacture of various articles related to the making of shoes. In 1926 it had 65 factories, of which nine were engaged in the manufacture of shoe machinery. During World War II a considerable portion of its facilities was devoted to war production, including light artillery. Since the war a great number of highly improved machines for shoemaking have been perfected and made available to the industry. Compo Shoe Machinery Corporation and International Shoe Machinery Corporation are among the other important factors in the manufacturing equipment field.

Production.—Through the development of machinery and the factory system, the production of shoes has been multiplied, wages in the industry have been greatly increased, the living conditions of the laborers have been elevated, and the quality and appearance of shoes have been markedly improved.

There were 1,599 shoe manufacturing establishments in the United States in 1899, according to the United States Department of Commerce. In 1919, after the close of World War I, the number declined to 1,449; by 1939 there was an additional sharp decline to 1,070; at the end of 1949 those reporting to the Bureau of the Census numbered 1,018.

Production of all types of shoes, other than rubber, in the United States in 1919 amounted to 331,225,000 pairs; in 1939 production reached 424,136,000 pairs; in 1946, which marked the all-time peak for shoe production in the United States, the total was 525,773,000 pairs; by 1949 production declined to 473,005,000 pairs. Production of shoes and leather was subject to rigid restrictions during World War II and sales of leather shoes were rationed at the consumer level. The record production of 1946 is attributed in large part to the fact that retailers were rebuilding their depleted inventories during that year.

In 1899 the value of footwear produced in the United States was reckoned at $258,969,580; by 1919 this total increased under the advance of prices in wartime to $1,155,041,436; in 1939 the total value of the product declined to $734,673,111; in 1947 it attained a total of $1,752,313,000, and by 1949 it again declined to $1,588,487,000.

The number of wage earners employed in the industry totaled 141,830 in 1899, increasing gradually to 225,216 in 1923, the peak year for shoe factory employment, and gradually declining to 172,310 in 1945, the last year for which employment figures are available.

The analysis of shoe production during 1949 in the United States by the Bureau of the Census, according to kind of footwear, showed totals for the principal classes as follows: men's, 97,769,000; youths' and boys', 16,869,000; women's, 207,241,000; misses', 29,228,000; children's, 25,717,000; infants', 22,552,000; babies', 13,239,000. Total production for 1949, including slippers for housewear, athletic and other footwear, was 473,005,000 pairs.

Geographically the shoe industry has tended through most of its history to be concentrated in certain centers and areas where raw materials and skilled labor have been readily available, but in more recent years it has spread itself to a greater degree. Since the industry originated in Massachusetts, that state always has led in shoe manufacturing and for many years towns

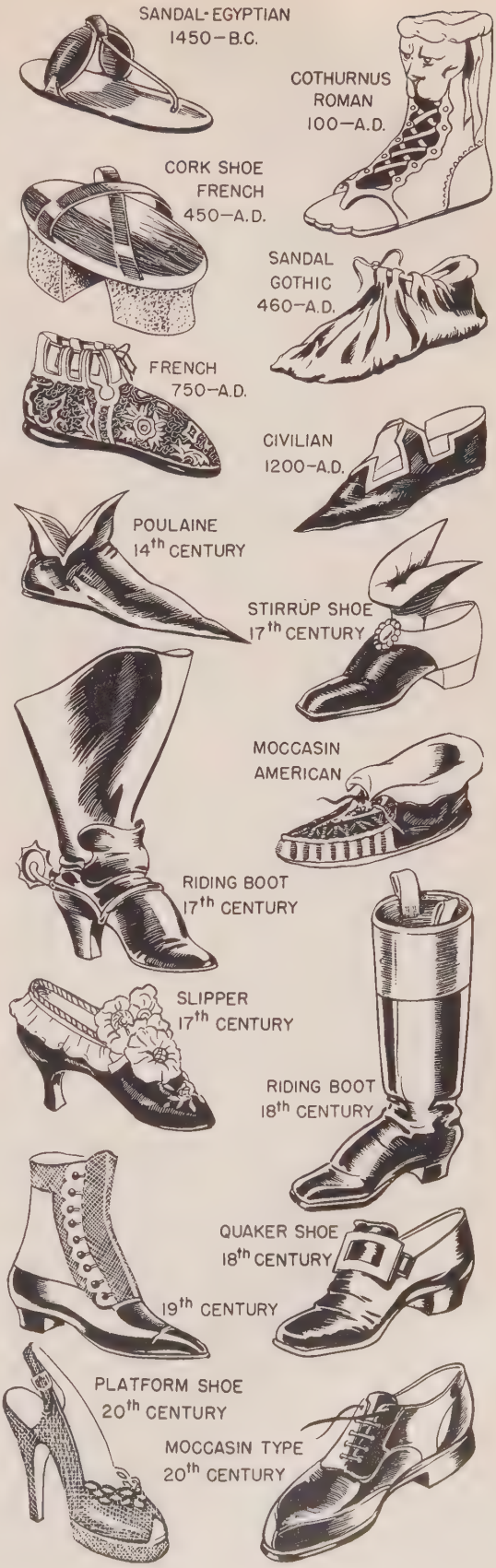
like Brockton, Lynn, and Haverhill were its foremost centers. Thence the industry spread to New Hampshire and Maine. New York City and several of the upstate New York cities, such as Rochester, Syracuse, Endicott, and Johnson City have played an important part in shoe manufacturing. In the latter part of the 17th and the early 18th century a section in New York City on the east side of Broadway around Maiden Lane was known as "the shoemakers' land." During the 19th century Brooklyn became a renowned center for the manufacture of women's fine quality shoes. Greater New York still maintains its prestige in the field of origination of footwear fashion. Duane Street is an important wholesale shoe center and the area around the Manhattan end of Brooklyn Bridge, including Spruce and Gold streets, forms the great leather market of the metropolis, known for years as "the swamp."

Since the end of World War I some of the historic centers of the industry in the Atlantic coast states have surrendered their position of unquestioned leadership to newer shoe trade areas in the Midwest, such as St. Louis, Milwaukee, Wis., and Portsmouth and Columbus, Ohio. Nashville, Tenn., is also an important center. Since World War II a considerable shoe manufacturing industry has developed in Los Angeles and southern California.

The old-time shoemaker, who worked in a little shop, made a case of shoes a week, or 6 pairs. The custom shoemaker made any sort of shoes his customers desired, for men, women or children. The factories of today specialize, one making men's shoes only, one making women's shoes only and one making children's only. Specialization is the secret of much of the progress of the American shoe trade. Some shops carry it so far that they make just one grade of shoes, over just one last.

Export.—Development of export trade in boots and shoes followed close upon the development of the American shoe factory system. Exports of shoes amounted to $419,000 in 1870. That was when machines were comparatively new, and machine-equipped shops made only a few shoes. In 1900 exports of shoes amounted to $4,000,000. Then all shops were machine equipped, and were able to produce more shoes than the home markets consumed. Exports to Cuba increased rapidly after the Spanish American War. Cuba is the best customer that American manufacturers have among foreign nations. Exports to South American countries began to increase after the completion of the Panama Canal. Exports increased enormously during World War I. For 1916 they amounted to 19,400,000 pairs, worth $42,500,000. Many of these shoes were for the armies of France and Italy. In 1929 shoe exports amounted to 8,562,000 pairs (men's, women's and children's) valued at $22,098,000. By 1944 the value of shoe exports had declined to $20,206,000.

Styles.—Styles in footwear have changed much, as people changed their activities. Puritans wore plain, square-toe shoes with buckles. Cavaliers wore great boots. People walked much, until railroads came, and necessarily wore stout footwear. Men of the colonial and early Revolutionary period wore small clothes, long stockings and low shoes with buckles. Jefferson provoked bitter criticism when, as



president, he first put on pantaloons and lace shoes. Women had one pair of coarse shoes for week day wear and a pair of fine kid shoes for Sunday best. Farmers wore knee high boots of heavy cowhide leather. A century ago New England manufacturers made many stogas (now stogies) or coarse brogans, for the slaves of the South. In pioneer towns it was a not uncommon practice for a thrifty farmer and his family to walk barefooted to town, carrying their shoes in their hands, and stop at the edge of the town to put on their shoes, and then walk in them to church. In grandmothers' time, serge Congress boots were common. They had uppers of cloth, with elastic gorings in the sides. Men wore Congress shoes, too. Children's shoes were crude. In shoemaking families, father's old boots were cut apart and were made over into shoes for the children. As the production of shoes multiplied, and the wealth of the people increased, a greater variety of shoes was produced, and people had at their command work shoes, dress shoes, dancing slippers, comfort shoes, fireside slippers, storm boots, fishing boots, baseball shoes, nurses' shoes and other kinds. Indeed, there is now a special kind of shoe for almost every employment or pastime.

Toward the close of the last century, a fashion of "toothpick toes" came in, for both men and women. These shoes had toes long and slim like a toothpick. The wearing of them cramped the toes, and broke down the arches of the feet, and tended to harm feet. To correct these faults, ingenious persons began to make arch supporters, toe protectors, corn plasters and other remedial devices. The sale of them runs into millions annually.

The period since World War I witnessed revolutionary changes in footwear fashions, beginning with the adoption of low-cut shoes for year-round wear, which occurred during the early 1920's. Prior to that time, low-cut oxford ties were worn quite generally in summer, but high-cut shoes for men and high-cut lace or button shoes for women were universally accepted for fall and winter. Shoe styles were generally standardized with minor variations in toe shapes and heel heights. The adoption of low-cut shoes for year-round wear, which came first in women's footwear, produced a multiplicity of new styles, including strap effects with ornamented fastenings, new tie effects, and elaborated pump patterns.

Younger men, especially college men, adopted low-cut oxfords for year-round wear at about the same time and within a few years most men were wearing low shoes in both summer and winter. Children's footwear tended to follow the development in men's and women's styles.

A somewhat similar change in shoe styles accompanied and followed World War II, when the casual trend in apparel and footwear swept the United States and resulted in the development of many designs of so-called play shoes, some with platform soles and wedge heels and many made by the California, or slip-lasted, process, which had been developed a short time before the war. Plastics, fabrics, and synthetic materials came into greater use, partly due to the wartime shortage of leather. These changes were most pronounced in women's and girls' shoes, but many new designs and patterns also appeared in men's shoes. More classic and conservative styles continued to be worn for street, business, and general use, since the new types were favored for leisure, sport, and recreation.

As standards of shoes have advanced through improvements in manufacture, there has also been improvement in the methods of taking care of shoes. The business of making shoe blackings is extensive. The business of blacking shoes is larger today than was the business of making shoes a century ago. Also, machinery for repairing shoes has been developed, and the modern repair shop established in every neighborhood. Now, according to estimates, 100,000,000 pairs of shoes are repaired annually, and the repairing business totals $300,000,000 annually.

Rubber.—Rubber footwear is comparatively modern. Early colonists wore snow shoes, or clogs and pattens, the latter being wooden soles which were strapped to the feet, over the regular shoes. The first rubber shoes, which appeared about a century ago, were called "gum shoes." They were made of pure rubber. They froze and cracked in cold weather, and they melted and stuck together in hot weather. It was not until Goodyear discovered his process of vulcanizing rubber that rubber footwear became practicable. The making of rubber footwear flourishes in Massachusetts, Rhode Island, Connecticut, and Indiana. Besides making storm footwear, commonly called "rubbers," the rubber shoe companies produce millions of pairs of sport and street shoes, called "sneakers." Rubber heels are made by the millions and during the last few years, the manufacture and wear of soles of rubber and fiber has increased rapidly. See also Boots and Shoes; Leather, Manufacture and Uses of; Leather and Shoe-Trade Technical Terms.

Fred A. Gannon,
Revised by: Raymond L. Fitzgerald, Editor, "Boot and Shoe Recorder."

SHOEMAKER, Michael Myers, American author: b. Covington, Ky., June 26, 1853; d. Paris, France, Aug. 11, 1924. He studied at Cornell University and after 1874 traveled extensively over the greater part of the world, making special anthropological studies. He published *Eastward to the Land of the Morning* (1893); *Kingdom of the White Woman* (1894); *Sealed Provinces of the Tsar* (1895); *Quaint Corners of Ancient Empires* (1899); *Palaces and Prisons of Mary Queen of Scots* (1901); *The Great Siberian Railway* (1903); *Heart of the Orient* (1904); *Winged Wheels in France* (1906); *Wanderings in Ireland* and *Islam Lands* (1910); and *Indian Pages and Pictures* (1912).

SHOGUN, shō-gŭn, the highest officer in the Japanese government during the continuance of the feudal system. He was originally a purely military official, commander in chief of the army and first vassal to the emperor. The office became hereditary, and the shoguns gradually acquired nearly all the real powers of government, leaving only the title of royalty to the emperor. The latter resided at Kyoto while the shogun held court at Yedo (Tokyo) whence he ruled in the emperor's name as his major-domo. The shogunate was abolished at the Meiji Restoration in 1868. See also Japan—*History: From the Earliest Times to 1853.*

SHOLOM ALEICHEM. See Rabinowitz, Solomon.

SHONTS, Theodore Perry, American railroad official: b. Crawford County, Pa., May 5, 1856; d. New York, Sept. 21, 1919. He was graduated at Monmouth College in 1876 and for a time practiced law, but soon became interested in railroad construction. He was in charge of the construction of part of the Iowa Central Railroad and afterward built and was controlling owner of the Missouri, Iowa and Nebraska Railroad. He also gained control of the Toledo, Saint Louis and Western Railroad. In 1905–1907 he was chairman of the Isthmian Canal Commission, to which post he was appointed by President Roosevelt. He was president of the Interborough Metropolitan Railroad of New York 1907–1919, and president and director in many important railroad and trust companies.

SHOOTERS' ISLAND, an island in Newark Bay, separated by a narrow channel from Staten Island, N. Y., one mile east of Elizabeth, N. J. It is chiefly noted for its large shipbuilding plant.

SHOOTING STARS. See METEOR.

SHORE, Jane, mistress of Edward IV: b. London, 1445?; d. there, 1527. She was remarkable for her beauty and cultivated mind. Her influence with Edward was never exercised but for the benefit of others. (See EDWARD IV.) Richard III, partly to revive among the citizens the memory of the licentiousness of his brother, whom he accused of being "the chief abettor of that witch Shore," determined to expose her to public ignominy by accusing her of witchcraft. He was unable to effect his purpose but directed her to be tried for adultery by the Spiritual Court, which condemned her to do public penance in a white shift at Saint Paul's. She was reduced to poverty and appears to have died in 1526 or 1527. Her story appears in literature in Shakespeare's *Richard III;* in a tragedy *Jane Shore,* by Nicholas Rowe, in many old English ballads, and it has been introduced upon the French stage.

SHORE BIRDS, the sportsman's name for that large group of limicoline birds, as plover, sandpipers, curlew, phalarope, oyster-catcher, etc. (qq.v.), which are to be found along the beaches of the sea or other large bodies of water, where they seek their food at the edge of the waves. Shore bird shooting is an amusement of the autumn and early spring, when these birds are migrating between the South and the far northern breeding-places to which most of them resort in summer, and is usually carried on by the aid of stationary decoys, and calls for skill and patience.

Consult Coues, E., *Birds of the Northwest* (Washington 1874); Elliott, D. G., *North American Shore Birds* (New York 1898); Job, H. K., *Among the Water Fowl* (New York 1902); Seebohm, *Geographical Distribution of the Family Charadriidae* (London 1887).

SHORE LARK, a small bird (*Otocoris alpestris*), a native of the north of America, Europe and Asia. Within the United States it is found in winter as far south as North Carolina and Illinois. The adult male is about seven inches long; in summer, lores, cheeks, gorget and band on top of head, ending in erectile tufts, black; nape, mantle and upper tail coverts pinkish-brown, white beneath. The eastern or typical shore lark breeds along the northern border of the United States and in British America. In winter it migrates southward in flocks, which frequent open fields and the seaside meadows. In the western and interior parts of the United States numerous distinct varieties occur, some of which breed in the mountains within our borders. They range as far south as Texas and Mexico. The shore larks are closely related to the famous skylark of Europe. They nest in a depression in the ground and lay four or five eggs—French white, mottled with dull olive-green or yellowish-brown, but very variable. Nesting begins very early in the spring and several broods may be raised. The shore larks have a beautiful song which is often heard while they fly high in the air.

SHORE LINE, the dividing line between land and water in rivers, lakes or oceans. Shore lines are continually being modified by wave work, especially on the larger bodies of water. Waves strike blows averaging several hundred pounds per square foot and, armed with sand and gravel, are powerful agents of erosion. They undermine cliffs and carve out sea caves. In many places, especially along the chalk cliffs of England and France, where the rocks are soft, coasts are worn back at an average rate of several feet a year. The island of Helgoland, which in the year 800 A.D. had a circumference of 120 miles, today has a circumference of only three miles, and would probably be worn completely away, were it not for artificial protection.

The material thus worn away builds beaches. Where the debris is coarse, boulder or shingle beaches result; where finer, sand beaches are formed. Much sand is drifted parallel to the coastline by shore or littoral currents (q.v.), and where it drifts past some bend in the coast, the beach is prolonged into a spit extending past the bend out into deep water. Due to the constant action of waves and tides the ends of spits are often curved into hooks, as at Sandy Hook. If a spit or hook grows out so that it connects an island to the mainland, a tied-island results. On low, flat, gently sloping coasts, the waves break some distance from shore. At this point sand is heaped up by the action of waves and undertow, and an offshore or barrier beach is formed. Between it and the mainland is a lagoon or salt marsh, which gradually fills with decaying vegetation and wash from the land, and here peat (q.v.) beds are often formed. Off the mouths of large rivers, deltas (q.v.) are built and extensive mud flats or tidal flats occur.

Shore lines are profoundly modified by changes of level. Because the ocean bottom is smooth, the uplift forms long straight coasts, known as coasts of emergence. Along such coasts abandoned beaches and wave-cut cliffs may be seen well above water level, testifying to recent uplift. Such beaches are numerous on the coast of California. When lakes are drained or dry up, such abandoned beaches are also common, as around the old shore line of Great Salt Lake (q.v.). On the other hand, when a coast sinks, or is drowned or submerged as it is usually called, the sea enters the river valleys, forming long, narrow and often branching bays, like Chesapeake Bay. The tops of former hills may become offshore islands, as has happened at many points along the coast of Maine. Drowned shores afford the best har-

bors. The famous Inside Passage to Alaska is the result of deep drowning of a very mountainous coast. See OCEAN; LAKE; and the sections on *Oceans, Lakes* and *Diastrophism* in the article on GEOLOGY.

SHOREDITCH, a metropolitan borough of London, England, northeast of the City. Area 658 acres. Here, on the site of an ancient Benedictine nunnery James Burbage built the first English playhouse, The Theatre, in 1576, and a little later The Curtain. Chatterton lived in Shoreditch in 1770. The district is poor and crowded. Pop. (1938) 80,360.

SHOREY, Paul, educator: b. Davenport, Iowa, Aug. 3, 1857; d. April 24, 1934. He was graduated from Harvard University in 1878, and was admitted to the Chicago bar in 1880. He was professor of Greek at Bryn Mawr College 1885–1892, resigning in the latter year to fill a similar chair at the University of Chicago. He was professor in the American School of Classical Studies at Athens 1901–1902, and was appointed by Columbia University Roosevelt professor in the University of Berlin 1913–1914. He was managing editor of, and a contributor to, *Classical Philology* from 1908. He published *De Platonis Idearum Doctrina* (1884); *The Idea of Good in Plato's Republic* (1895); *The Odes and Epodes of Horace* (revised ed. 1910). *The Assault on Humanism* (1917).

SHORT BALLOT. See BALLOT.

SHORT CIRCUIT. See ELECTRICAL TERMS.

SHORT-EARED OWL, a small, nearly cosmopolitan owl (*Asio accipitrinus*), so called because its ear-tufts are inconspicuous as compared with those of its relative, the long-eared owl (*A. wilsonianus*). It is buffy, whitish, striped with dark brown, and 15 inches in total length. Its habits are those of ordinary owls (q.v.).

SHORT STORY. Characteristics.—The definitive nature of the short story is implicit in the adjective and noun comprising its name. As a story, it narrates a series of events, or a single incident, involving individuals in mental or physical activity. Thus, like all fiction, it portrays; and its success depends upon the immediacy achieved between the reader and the object portrayed. As a short story, however, it cannot effect this immediacy by the means common to the novel, such as leisurely characterization, detailed description, and repetition. Instead, it must portray with mirror-like swiftness and completeness.

For this reason, the short story is most powerful through graphic narration. This is not to say that its subject matter can be only simple and realistic. Of all literary forms, the short story is in fact the least restricted in subject matter, for its length permits treatment of subjects that could not alone sustain interest in a longer form. From earliest times, the short story has served as allegory, fable, and moral example. It has drawn themes from matter supernatural and natural, romantic and realistic, grotesque and mundane. The abnormal personality, as well as the representative one, may be portrayed by it; mental processes as well as physical action; casual happening as well as arresting incident. All these have a place in the short story, provided they are translated into the concrete. Growing consciousness of this necessity has forged the techniques that have made possible significant short-story writing.

Something of these techniques was known to the earliest storytellers, for traces of their application can be seen, for example, in the ballad, (q. v.) which is a short story told in song. In its objectivity, impressionistic description, directness of portrayal, and totality of effect, the ballad anticipates the principles expounded and applied by the greatest modern short-story writers.

Significant too is the ballad's origin in verse form, which dictated its storytelling technique. Many tediously long stories have of course been told in verse; but it is also true that verse, being disciplinary, is more conducive to artful brevity and compression than prose. It is more than coincidence that Edgar Allan Poe formulated his philosophy of the short story after he had studied balladry and his own method of poetic composition. It is significant too that Geoffrey Chaucer chose to cast his stories almost exclusively in poetic form; that in an age which smothered the short story by its heavy prose rhetoric, Edmund Spenser found in verse the best medium for his allegorical stories; that such poets as Robert Burns, Samuel Taylor Coleridge, and John Keats produced stories that might have been dictated by Poe's principles; that Robert Browning, in his dramatic monologues, achieved the character story ahead of the prose writers.

It has been essential to the development of the short story that, periodically, there should occur a turning back to folk literature and the laborious rediscovery of effective techniques once applied instinctively; for writers often forget that a single clear picture is worth a multitude of words. Especially the short story, because of its spatial limitation, must be a picture. As it is not, however, a picture composed of lines and color, but of words, it can appeal only indirectly to the senses. But what at first seems to be a deficiency is actually a source of strength, for the short story can appeal equally, if indirectly, to *all* the senses. Hence, in the short story, words achieve their maximum power when they create the illusion of sense-impression. It is not surprising, then, that in an age that develops a rhetorical style impeding the direct presentation of scene, the short story is extinguished; nor that the short story most naturally flourishes and develops in an age that expresses itself with simplicity and directness.

For this reason, the history of the short story reveals, not so much a steadily ascending line of continuity, as a series of peaks, which, until the 19th century, were widely separated in time. Each in a different way, Giovanni Boccaccio and Geoffrey Chaucer realized the rich possibilities of the form, but it was destined shortly to drop into obscurity. Over four centuries later, Edgar Allan Poe brought it into a state of self-consciousness by propounding a technique that was applicable far beyond his own stories.

Next to further the development of the short story was the advent of modern realism. As in all stages of the history of the short story, the importance of realism lies not in subject matter, but in the writer's attitude toward his material. The realist desires to portray what he sees exactly as he sees it; consequently, he will seek all means of graphic and direct portrayal. He will, furthermore, keep himself out of his picture, and as a result of this objectivity, his story

will contain its own verisimilitude, which is more pertinent to its success than the realism of the subject matter. Combining realism of attitude with deliberate technique, Guy de Maupassant wrote stories that endure as perfect models of their type.

The short story advanced in proportion to the writer's endeavor to transcend the limitations of his form. Even after the accomplishments of Poe and Maupassant, spatial limitation remained provocative. Thus, the short-story writer next sought means to *suggest* more than his space allowed him actually to say. This stage is best represented by Anton Chekhov, whose potent influence still motivates experimentation.

First Masters.—The *Decameron* of Giovanni Boccaccio (1313–1375) and the *Canterbury Tales* of Geoffrey Chaucer (1340?–1400) show how individual creativeness could breathe life into the conventionalized forms that were already the heritage of the short story. These writers drew freely from the great spontaneous stream of storytelling that started with man and flowed from the Orient through the Continent and on into England.

The frameworks of these two collections are in themselves evidence of the universal popularity of the short story as a prime and respected means of entertainment. The *Decameron* (q. v.) stories are told by a group of young men and ladies to while away the time in the idyllic retreat that shelters them from the grim plague raging in Florence. Chaucer's pilgrims tell their stories to shorten their journey to Canterbury, where they will pay homage to Thomas à Becket. In all the stories thus told, there is a spirit suggesting an effortless love of storytelling—a spirit soon to be lost as the story grew more literary and widened the gap between teller and listener.

Boccaccio drew chiefly upon the Milesian tale of the type loosely strung together in the *Golden Ass of Apuleius,* (q. v.) but source, or even form, is of minor importance when set next to the vitality that he brought to the short story. It was Boccaccio's zest for life, rather than an intellectual regard for technique, that forged his stories. The whole of the *Decameron* pulsates with emotion. Sometimes the motivating force is intense love or hate, but more often it is quite simply man's will to pleasure, the desire to attain satiation and then move on to new objects. His plots showing simply how satisfaction is achieved or denied, Boccaccio had little need to probe beneath the surface picture, or to individualize characters, for the basic drives of man are common to all. This first great Human Comedy suggests how the short story can survive, in spite of awkwardness of form, by virtue of the consistency and ardor of its creator's approach to life, and his ability to portray this ardor directly.

Unlike Boccaccio, Chaucer was a virtuoso of short-story form. The variety of form in the *Canterbury Tales* (q.v.) makes it a great roundup of the medieval short story. For example: a chivalric *romance* is told by the Knight; a *lai* (Celtic fairy tale) is the Wife of Bath's contribution; a saint's legend is piously related by the Prioress; *fabliaux* (realistic satires, especially pointed at the clergy and women) are told by the Miller, the Reeve, the Shipman, the Friar, and the Merchant; a *fable* is the *Nun's Priest's Tale;* and the *exempla* (short stories illustrating a general statement usually of a didactic nature) told by the Monk and the Pardoner indicate variety within the same form, for the Monk relates a mere list of tragedies, whereas the Pardoner's tale of greed is at once so concrete and suggestive that its existence alone would prove Chaucer a master of the short-story form.

Boccaccio's essential realism made him objective, but Chaucer's objectivity is a conscious story technique. In the general prologue, he makes a significant plea for realism, saying that the reader must allow him to tell the stories in the exact words of the pilgrims. The effect of this is the achievement of the necessary tone of each type—the ribaldry of the *fabliau,* the simple piety of the saint's legend, the delicacy of the *lai*—and, consequently, the removal of all traces of Chaucer the creator.

The subsequent history of the short story is comprised of the efforts of writers to recover the height reached by Boccaccio and Chaucer. The short story lost favor in the full bloom of the Renaissance. It could neither compete with the long prose romances and the drama, nor survive under the stylistic devices that puff up such writing as John Lyly's *Euphues* (1578, 1580). The writer's attention became fixed upon the techniques of expression, not those of portrayal. so that neither Chaucer's graphic clarity nor Boccaccio's direct realism was possible.

The advancement of science stimulated man's quest for certainty in communication, which was accompanied by a deliberate change to simpler prose style. New directness and simplicity are seen first in such nonfiction writings as René Descartes' *Discourse on Method* (1637) and John Locke's *An Essay Concerning Human Understanding* (q.v. 1690). These tendencies regenerated the novel, but the short-story form had been too long buried to be quickly resurrected.

True, there were glimmerings of the short story in the periodicals, and these essay-stories were to help lead American writers to an awareness of short-story form. Also, the journalist-novelist, Daniel Defoe (1661[1]–1731), struck off at least one piece—*True Relation of the Apparition of one Mrs. Veal*—which, with its combination of realistic technique and ghostly theme, retains the power to interest. Chiefly, however, writers had forgotten what to do with the short story. Novelists, aware of short-story material, frequently incorporated it into their novels. A notable example of this is the extraneous Man of the Hill story in Henry Fielding's *Tom Jones* (1749). What was needed was the directive force of men willing to declare the short story an independent form. In this, America was to speak first.

Craftsmen.—In 1842, Edgar Allan Poe remarked that the only noteworthy short-story writers produced by America were Washington Irving and Nathaniel Hawthorne. Of course, Poe should have included his own name. Interestingly, this triumvirate was significantly influenced by German and English romanticism. It was the peculiar ability of Irving (1783–1859) to borrow German legend and manipulate it so that it seemed indigenous to America. Except to the scholar Rip Van Winkle does not betray his German origin. In fact, *Rip Van Winkle,* and other tales with an American setting (in the *Sketch Book* and *Tales of a Traveller*), (qq.v.) created a body of American legend acceptable to even the

[1] Some authorities give birthdate 1659? and 1660?.

most fastidious, for Irving wrote in the style of the 18th century English essayists.

Not unnaturally, then, his pieces sometimes contain more of the essay than of the story, and the somewhat apologetic title *Sketch Book* suggests that he was not quite certain that the short story could stand on its own strength as a finished literary product. Even so, his humorous objectivity and occasional directness of portrayal made his tales something more than apologues. This new something was recognized by his first readers, and the great vogue of the *Sketch Book* led indirectly to the establishment of the many annuals, lady's books, and gift books that were soon to provide the first respectable home for the single short story.

With Nathaniel Hawthorne (1804–1864), the short story gained in conciseness, chiefly because he saw it as a means to question and probe as well as to portray aimless scene and character. Hence, his plots tightened into allegory, by which he could represent ideas in terms of concrete symbols. He was quite frank about his didactic concern, often indicating it in titles: *The Man of Adamant, an Apologue; The May-Pole of Merry Mount, A Parable; Egotism, or the Bosom Serpent.* Too often the abstract idea is apparent in the concrete symbol, so that the stories seem remote.

One of Hawthorne's favorite themes concerns the man who experiments with life rather than participates in it (*Wakefield* and *Dr. Heidegger's Experiment*). Hawthorne himself seems to be the scientist at work in the laboratory, not of life, but of the ideas abstracted from life. Thus, he achieves objectivity; but it is the objectivity of the lecturer who shows slides to illustrate what he has to say. Only rarely can his presence be forgotten, for there is the sound of his voice, or the shadow of his pointer. If illusion has been achieved, it is quickly shattered when the lights come up and he concludes without benefit of slides.

Hawthorne's collection of stories under the title of *Twice-Told Tales* (q.v.) provoked the definitive review in which Poe at last established the short story as an independent form. Because of its brevity and consequent emotional intensity and unity, Poe (1809–1849) had already assigned the short lyric first place in poetry; and, in his own stories, he had evolved a distinctive technique aiming at the same qualities. Thus, by 1842, he was ready to expound certain fundamental principles of short-story technique.

According to Poe, the short story (1) must be of such length as to be read in one sitting; (2) must create a single effect; (3) must not contain one word which in meaning or tone fails to point to that preconceived effect; (4) must convey the impression of finality, so that the reader desires neither an opening other than that provided, nor a continuation beyond the final sentence. These principles subordinate plot or theme to effect, thus setting up, for the first time, a criterion other than pure narration. Words are to be used for their emotive, rather than intellectual, power. Brevity is to be artful compression by the elimination of what detracts from the desired effect, and the abstraction of what enhances it. Significantly, these principles are applicable to any subject matter. It is presentation alone that defines the form.

Poe's influence was not only that of theory, for he applied as well as formulated his principles. He served a very deliberate apprenticeship in short-story writing by producing parodies of the Terror Tale that flourished in England and the Continent. Parody-writing taught him much, for the exaggerated stylistic devices he thus developed (*Shadow: A Parable,* for example) became instrumental in creating the single effects of such characteristic tales as *The Fall of the House of Usher* (q.v.) and *The Masque of the Red Death, A Fantasy.*

Poe's technique in theory and practice makes it clear that over and above his attraction for things of mystery and imagination was his rationalism. The fact that many of his tales were written to induce mood should not obscure the equally important fact that they were produced by the most objective approach to style and theme that had yet appeared in fiction writing. Starting with the single impression to be achieved, Poe isolated from the possible means of expression only those elements most productive of the desired effect. In a purely atmosphere-sketch such as *Shadow,* he secured the effect wholly by stylistic devices; but in a plot-story such as *Ligeia,* he extended the same isolating process to create incidents that would most effectively point the theme (power of the human will). In fact, Poe wrote his stories in the spirit of the detective who has solved the mystery but must carefully retrace his steps and re-examine the clues to construct a logical case. It is not surprising, then, that he should have put his technique to thematic use and thus created the detective story.

When from his mysteries Poe eliminated the supernatural, he originated a type of story distinct from the Terror Tale. In such stories, the reasoning process leading up to the solution of the mystery takes precedence over the mystery itself. Sometimes the ratiocination is almost mathematical (*The Gold Bug,* q.v.); sometimes it deduces the nature of the mystery from knowledge of the character of the culprit (*The Purloined Letter*); at other times it deduces the identity of the criminal from the nature of the crime (*The Murders in the Rue Morgue*). The true hero is Reason, which Poe personified in his character Dupin.

The modern detective story descended directly from Poe, but probably its lasting vogue is due to Dupin's first successor, Sherlock Holmes. Sir Arthur Conan Doyle (1859–1930) mixed Poe's method with the personality of an Edinburgh professor and created a character who has become legend to all classes of readers. As Sherlock Holmes is a fuller-bodied character than Dupin, so is his foil, Dr. Watson, who succeeded Poe's vehicular first person (the narrator).

In both his stories of reason and of imagination, Poe sacrificed many time-honored elements of fiction for the sake of his single effect. It is perhaps because of this sacrifice that Poe's stories were influential in his own country only after a long delay, and then in an indirect way. If, by concentrating upon the single impression, he avoided the loose construction of Irving's stories and the didactic allegory of Hawthorne's tales, he also lost concreteness of character and places. He created memorable plots, but not people; his stories have the coloring of moods, not localities. There is in his writing no intrinsic element to tie it to America. In contrast, it is instructive to note that Nikolai Gogol (born the same year as Poe) exerted inestimable influence over Russian

writers because of his portrayal of Russian people in Russian scenes. No American writer can say of any one of Poe's tales what Maxim Gorky said of Gogol's: "We all spring from Gogol's *Overcoat.*"

Paradoxically, however, Poe exerted great influence upon the short story in general. The power of that influence came from the specific nature of his technique as applied in his own stories, as well as the concise formulation of his theory of technique. Familiarity with his work arose especially in France, first through the plagiarism of hack writers (possible because of the lack of international copyright laws), and then more legitimately through the excellent translation of his tales by Charles Baudelaire. Interestingly, the next major achievement in short-story writing came from the French Maupassant.

Realists.—Although Guy de Maupassant (1850–1893) knew and was impressed by Poe in translation, he was by temperament and association more sensitive to the realism which was already giving new form to the fiction of both Russia and France. Under the exacting tutelage of Gustave Flaubert, Maupassant served a seven-year literary apprenticeship. Flaubert (1821–1880) was a realist, but over and above his conviction that the writer should draw his material from life, was his belief that the true value of art lay in form and expression. Maupassant did not ape his master's fastidious craftsmanship, but from him he gained a sense of form which outlines his stories with the same definiteness as Poe's.

Thus, Maupassant's realism is neither the spontaneous overflow of sensual delight that animates Boccaccio's tales, nor the experimental and formless naturalism of Émile Zola (1840–1902) and school. Rather, it is the reshaping of life data to illuminate the effect desired and to subordinate whatever is irrelevant to the effect. As he wrote in his preface to *Pierre and Jean,* "the realists of art ought rather to call themselves the illusionists." Striving for the effect of realism, Maupassant drew upon people and incidents, whereas Poe sought to achieve emotional effects by creating moods and atmospheres. Yet the techniques are essentially similar. For example, Maupassant isolates the sadism of Baron van Eyrick (*Mademoiselle Fifi*) in a series of illustrative incidents, just as Poe isolates human will power by portraying its triumph over death in *Ligeia.*

Maupassant was an ironist, but his expression of attitude is so embedded in plot and symbols that it seldom appears distinct from the actual narration. Both *A Piece of String* and *The Diamond Necklace* are constructed out of a juxtaposition of events and circumstances which not only constitute plot, but suggest the irony of fate. Still another kind of irony is expressed by the juxtaposition of types of people, showing especially the shallowness of the falsely self-righteous individual in contrast to the moral strength and sincerity of the conventionally shunned one. *Boule de Suif* is the acknowledged masterpiece founded on such a contrast, and the *House of Tellier* is also created out of the meeting of the conventional and the unconventional.

Essential to Maupassant's form is his objectivity. His characters are known through their appearance and action. Their motives are not analyzed, and the inner recesses of their minds are not probed. Maupassant had contempt for analytical fiction, which he declared in his preface to *Pierre and Jean* to be "composed after the manner of the philosopher writing a book on psychology." The objective writer is the true realist, for he knows that "psychology ought to be concealed in a book, as it is concealed in reality, beneath the facts of existence." Thus, in his stories he naturally achieved the brevity and concrete portrayal essential to the form, while the Victorian English writers fumbled in handling the short story because they could neither reduce the luxuriant verbiage nor sharpen the leisurely style fostered by their huge novels.

Also because of his objectivity, plot appears to dominate Maupassant's stories. The true nature of his illusory realism was soon ignored, largely because it was too personal to be imitated. However, the sheer plot-technique proved easily applicable. In America, this technique was studied by Henry Cuyler Bunner (1855–1896), whose *Made in France* is a collection of deliberate paraphrases of Maupassant's stories given a Yankee twist, further complications of plot, and the intensified surprise-ending. In this way, certain elements of Poe's technique returned to exert force upon the American short story, finally producing a writer who attained a national popularity beyond that of any other short-story writer—O. Henry (William Sydney Porter, 1862–1910).

Also, the American short story had received a strong impetus from Bret Harte (1839[1]–1902), who had combined certain elements of the Poe-Maupassant technique with a theme from Dickens: beneath that rough exterior there beats a heart of gold. After the notoriety gained by *The Luck of the Roaring Camp* (q.v.), Harte exploited both the formula and the latent sentimentalism of this theme. His superficial realism, sentimentalism, and arresting plots were a winning combination, and it is little wonder that his influence was great.

Realism came falteringly to American fiction in devious ways. First it appeared in the form of the kind of indigenous humor immortalized by Mark Twain (Samuel Langhorne Clemens, 1835–1910), who in at least one story, *The Man That Corrupted Hadleyburg* achieved a perfect blending of tragedy and comedy without either the sentimentalism of Harte or the sensationalism of Maupassant. Too, imported realism had an iconoclastic vogue in the 1870's, when translations of Ivan Turgenev began to appear in American magazines.

Essentially, however, a serious realism came to the American short story, not as a literary creed, but as the writer's conviction that he had a moral obligation to tell the truth about the particular section of the country with which he was intimately associated. Local color had been used quite naturally by writers such as Harriet Beecher Stowe (1811–1896), Sarah Orne Jewett (1849–1909), and George Washington Cable (1844–1925), and it was employed with technical deliberateness by Bret Harte. It served Mary E. Wilkins Freeman (1852–1930) in her depiction of the less romantic aspects of New England life; and in Hamlin Garland (1860–1940) it became a means to call attention to the farmer's struggle for existence in the stricken Middle West. Although a new kind of social didacticism thus

[1] Some authorities give birth date as 1836 and 1839.

entered the short story, concreteness of portrayal was furthered.

An inevitable product of realism in the short story was impressionism, the rendering of immediate sense impression. With his insistence upon compression and effect, Poe had provided the foundation for impressionism, but because in his own stories he was intent upon evoking an emotional response, he had little interest in providing the graphic detail necessary to sense impression. Under the influence of realism, however, writers turned to the problem of achieving immediacy of sense-objects. Instead of presenting an object as a whole, the impressionist depicts only its most suggestive physical details. His chief device is compressed imagery that evokes in the reader a reaction to the physical properties even before it results in a complete picture of the object. Because of its swiftness of description and the immediacy of object in which it results, impressionism is admirably suited to the short-story form.

The stories of both Ambrose Bierce (1842–?1914) and Stephen Crane (1871–1900) contain well-developed impressionism, but the bitter irony of these writers prevented their becoming forces of influence. Chiefly they point to the future, Bierce anticipating William Faulkner (Falkner, 1897–), and Crane, especially in style, foreshadowing Ernest Hemingway (1898–). Significantly, these early impressionists were newspaper men. Journalism, with its emphasis upon concrete, brief, and arresting reporting, influenced the short story near the end of the 19th century, as the perfection of motion pictures was to suggest new devices for swiftness of portrayal to 20th century writers.

In the end, however, it was not undiluted realism that triumphed, but realism mixed with romanticism and sentimentalism. Robert Louis Stevenson (1850–1894) had continued the romantic tradition, and even such self-styled realists as Frank Norris (1870–1902) and Jack London (1876–1916) are revealed as romanticists when set against Stephen Crane. The great summation of these diverse tendencies is the stories of Rudyard Kipling (1865–1936), the first influential English short-story writer of the modern period. Kipling borrowed promiscuously, but the resulting blend was so perfectly proportioned that it carried the mark of powerful originality. His stories in *Plain Tales from the Hills* (q.v.) reveal the technical devices of Poe, the sentimentalism of Harte, the realism of Maupassant, an impressionistic method of description developed by his own experience in journalism, and, finally, the romanticized Indian setting. So potent was this combination that practically all writers were attempting Kiplingized stories before the turn of the century.

Genuine realism was thus retarded, but its technical lessons were retained. The means to achieve immediacy of object were known at last to all writers and applied to all types of subject matter. Technically, the short story had advanced as far as it could go in one direction. Boundless imitation of the old would have been inevitable had writers not become aware that in Russia had arisen a new form of storytelling.

New Technicians.—From the time of Nikolai (Vasilievich) Gogol (1809–1852), Russian realism never portrayed merely the external world, but included the psychological moment as a natural datum of existence. This is apparent in the *Sportsman's Sketches* of Ivan (Sergeyevich) Turgenev (1818–1883), and is a distinguishing mark of the great novels of Leo Tolstoy (1828–1910) and of Fydor Dostoyevsky (1821–1881). When in fiction a thought is allowed a significance equal to that of a physical action, there is necessarily a lessening of formal plot. Both these novelists wrote a few stories exhibiting this kind of realism, but it was left to Anton (Pavlovich) Chekhov (1860–1904) to perfect from it a short-story form.

Chekhov was by temperament an objective, yet compassionate, artist. As a result of this, as well as of the tradition of realism to which he fell heir, he wrote stories which at first seemed revolutionary in their lack of technique. However, upon translation, the same stories incited so many attempts "in the Chekhov manner," among English and American writers that the presence of applicable technique was clearly demonstrated.

Chekhov was a versatile writer, but his unique contribution is the story in which, according to the popular description, "nothing ever happens." For an understanding of his technique, it is instructive to compare his story *The Schoolmistress* with Maupassant's *Miss Harriet.* Both stories portray the lives of frustrated and futile spinsters. Through brief description of Miss Harriet's appearance and references to her past, Maupassant makes explicit the restricted nature of her life, as well as the fact that her present religious fanaticism is merely a perversion of repressed normal tendencies. She falls in love with the young painter who has been friendly to her out of curiosity, and she commits suicide in recognition of the futility of her passion. In tribute to her wasted life, the painter kisses the lips of the corpse.

Except for a few impressionistic details, Chekhov does not describe his Schoolmistress. The latter thinks briefly upon her past, but not upon momentous forces or events. She is no fanatic, and she holds a casual conversation with the wealthy, attractive gentleman she meets on the road back from town. A chain of thought causes her to think fleetingly of her life had she been his wife, but she is not in love with him. She rides on, arguing with some peasants, and again seeing the man as she draws up to a railroad crossing. That is all. Instead of plot, this is a candid-camera shot of a representative moment. By seeing it, the reader becomes aware of the *essence* of this particular life, and, through that, of the *typical* nature of that life.

Chekhov's technique is thus one of abstraction and implication. He abstracts from the individual what is most representative, and by this he implies the universal. The process of abstraction guides his choice of scene and dialogue, both of which are likely to appear aimless and casual, because it is seldom the significant incident or the directed conversation that is representative. By this means, Chekhov (with the help of the reader) overcomes spatial limitations while yet retaining immediacy of object through graphic portrayal of the individual. To call Chekhov a less skillful craftsman than Maupassant is simply to state preference for a certain kind of story.

Katherine Mansfield (Katherine Middleton Murry, *nee* Kathleen Beauchamp, 1888–1923) was the first short-story writer to make direct application of Chekhov's technique. She was even more precise in the process of abstraction, and her impressionism gives greater concreteness

to the depiction of the chosen moment. Too, her implications are often helped by concrete symbolism, such as the pear tree in *Bliss*. At their best, her stories are as intense in their connotations as their surface pictures (*The Fly,* for example), and they convey a sense of the inevitable. Because, however, she believed that every moment was equally representative, some of her stories naturally lack this intensity. In all instances, she wrote with precision, strictly adhering to her abstract form. "I feel as fastidious as though I wrote with acid," she once explained in refusing to cut a single line from a finished story.

Although the stories of Joseph Conrad (1857–1924), John Galsworthy (1867–1933), Arnold Bennett (1867–1931), William Somerset Maugham (1874–), and Stephen Vincent Benét (1898–1943) continued to exhibit the fine craftsmanship of the older traditions, more experimental writers were attracted to the new technique. James Joyce's only volume of short stories, *Dubliners,* fell in 1914 upon an unheeding world, but it represents a stage in the evolving concept of what makes a story. Scenes connected only by the slender unity indicated by the title of the collection are substituted for formal plot.

Five years after *Dubliners,* Sherwood Anderson's *Winesburg, Ohio* appeared, revealing the same lack of formal plot. With Anderson (1876–1941), the new technique entered the American story almost in disguise. In such a story as *I'm a Fool,* there is the sound of the story-teller's voice spinning a rambling yarn, yet there is no more yarn than in Chekhov, and the rambling is artful. The process was completed by Ernest Hemingway, who told stories in the Chekhov manner with such simplicity of style that even greater concreteness was secured. To ensure the reader's reaction to the object presented rather than to the writer's emotion, Hemingway pared off as much as possible the intellectual nature of words.

When writers were relieved of the spatial restrictions of formal plot, they were free to give to the short story a more significant content than it had ever before received. Also, writers as varied in attitude and style as Thomas Wolfe (1900–1938), Erskine Caldwell (1903–), James T. Farrell (1904–), John (Henry) O'Hara (1905–), William Saroyan (1908–), and Katherine Anne Porter (1894–) could apply the technique of abstraction and implication, and yet retain high degrees of individuality.

Throughout the rapid development of the short story which has taken place since the time of Poe, the broad premise of Poe's technique has been retained, for the short story must always aim at singleness and totality of effect. It is not strange that the course of this development, through realism, impressionism, and abstractionism, should parallel that of painting, for the two forms exist within similar spatial boundaries. As painting had to evolve ways to escape being merely photographic reproduction, the short story confronted the necessity of preserving concreteness of portrayal while suggesting more than is portrayed. It is this conscious search for technique that makes the short story something more than mere anecdote or skeletal novel.

See also AMERICAN LITERATURE; ENGLISH LITERATURE; REGIONAL LITERATURE; Literature sections in articles on countries, biographies of well-known short-story writers.

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SHORTER, Clement King, English editor: b. London July 19, 1857; d. Great Missenden, England, Nov. 19, 1926. He was in the Civil Service from 1877 to 1890, when he began editorial work and was editor of the *Illustrated London News* from 1891 to 1900; founded *The Sketch* (1893) and edited it for seven years; also during the same period editing the *English Illustrated Magazine.* After 1900 he was editor of *The Sphere.* His Brontë studies are notable contributions to English literature and include *Charlotte Brontë and Her Circle* (1896); *Charlotte Brontë and Her Sisters* (1905); *The Brontës: Life and Letters* (2 vols. 1907); among his other works are *Sixty Years of Victorian Literature* (1897); *Immortal Memories* (1907); *Napoleon in his Own Defence* (1910); *George Borrow and his Circle* (1913); *C. K. S., an Autobiography* (1926).

SHORTER CATECHISM, a catechism extensively used by English-speaking Presbyterians throughout the world, and which was framed during the time of the English Commonwealth. A committee of assembly was appointed Aug. 5, 1647 to prepare the Shorter Catechism, which was presented to the English Parliament November 26, that year, and was ordered to be printed by vote of Parliament, April 16, 1648. The Scottish general assembly adopted the catechism July 16, 1648, and the Scottish Parliament the following February ratified this action. See CATECHISM.

SHORTHAND has often been defined as the art of writing as fast as a man speaks. The Standard Dictionary definition is better: Shorthand — any system of handwriting that reduces the number of muscular movements required to present words and sentences in graphic outline . . . opposed to longhand. The former definition applies with accuracy only to the most highly developed phase of shorthand — verbatim reporting — applies with much less force to the enormously larger field of business office stenography and ignores the largest and most important potential field of shorthand — shorthand for general personal (nonprofessional) use.

Four Principal Characteristics.—The shortness of shorthand as compared with longhand is due to four principal factors:

1. Shorthand writes by sound, ignoring the eccentricities of common spelling. This feature alone would, even though each letter of shorthand averaged as long as the letters of longhand, save 15 per cent of time and effort directly, by eliminating superfluous letters, and still more indirectly, by eliminating the mental hesitation involved in following the inconsistencies of common spelling.

2. Shorthand uses for its basic alphabet the simplest signs which its inventor can devise or adapt — seldom averaging more than 1.1 strokes per letter, as compared with about four strokes per letter for longhand as usually analyzed. This feature alone does not, as might first appear, save as much as 75 per cent of the labor of writing, for the letters of longhand are so devised as to join with each other in any order with no appreciable modification of form, direction or position relative to the line of writing — a condition conducive to the highest speed of automatic action and impossible to duplicate fully in any shorthand.

3. Shorthand, by various devices such as the position of strokes relative to the line of writing or to each other, or modifications of length or shading, or initial or final circles, hooks or loops, known as appendages, gives to a single stroke a multiple significance, so that in Pitmanic shorthand, for example, the sign ↘ expresses or implies by logically related rules every one of the six consonants of the word *sprints* in their proper order.

4. Shorthand abbreviates words or phrases much as in longhand, expressing or implying only so many of the sounds as will serve to identify the words written. This is carried to a high degree requiring careful memorization in certain forms for common words, known as wordsigns, and is sometimes carried still further by arbitrary or exceptional use of dots or ticks for particular words, such outlines being known as arbitraries.

Number of Systems.—In the absence of fixed standards of measurement or clear determination of fundamental principles (see SHORTHAND SCIENCE OF) more than a thousand dif-

ferent systems of shorthand have been published for English alone — a confusion unparalleled since Babel. Fortunately at least nine-tenths of these are of historic interest only to-day, while the remainder may be grouped in a comparatively few more or less well-defined classes.

Three Distinct Styles.— No intelligent answer can be given to the first question of the layman: "Which is the best system of shorthand?" without recognizing that there are three distinct broadly marked fields of shorthand use which may be designated as reporting, business and personal — related, to be sure, but each with its own peculiar problems.

A reporting style of shorthand must use all practicable shorthand devices to their fullest extent with effective (legible) speed, the paramount consideration, attaining a speed from 150 words per minute up to the highest yet achieved, between 280 and 300 words per minute. Such a style will be used for court reporting, legislative reporting, speeches, conventions and in general all verbatim reporting purposes, where the speaker ignores the reporter. Mastery of a reporting style requires long and arduous professional training extending over a period of several years, and commands rewards proportionate to the effort required. The most competent estimates place the total number of verbatim reporters in the United States under 5,000.

A business style of shorthand must use abbreviating devices to some extent but must maintain positive legibility and reasonable simplicity even at the expense of speed, attaining speeds from 90 to 150 words per minute. Such a style will be used chiefly for business office dictation of correspondence, numerically much the largest field of shorthand to-day. Reasonable mastery of a business style is afforded by the average six months' business school course involving about 300 hours' study. Though the 1910 census shows only about 330,000 professional users of shorthand or typewriting, there are undoubtedly to-day (1919) at least 500,000 stenographers or business style shorthand writers in the United States.

A personal style of shorthand must make phonetic correctness and completeness and simplicity the paramount considerations, attaining speeds from 60 to 100 words per minute. Such a style will be used for personal correspondence, by professional writers or speakers for original composition, for lecture notes, abstracts, memoranda and potentially for all purposes of longhand. No system not particularly designed for such personal style use can be mastered to the point of even 60 words per minute speed in less than 100 hours by the average student. Considering the enormous potential value of shorthand for general personal use — the goal and vision of shorthand inventors for centuries — the number of personal style, non-professional, shorthand writers is pitifully small — a condition for which the futile effort to make business style and reporting style shorthand systems serve this distinctive field is chiefly responsible. Each of these three styles has its own problems and its own field, and in each field at the present time a fundamentally different type of system is most prominent.

Reporting.— In the reporting field to-day Pitmanic shorthand is dominant, despite the most strenuous efforts of competing systems of other types. A recent census of the National Shorthand Reporters' Association indicates that 91 per cent of its membership write some form of Pitmanic shorthand.

Business.— In the business field an entirely different type of system, often miscalled "script" shorthand, of which the principal American representative is Gregg shorthand, has recently achieved a marked predominance. A recent questionnaire sent out by the National Educational Association to over 11,000 schools, and eliciting over 3,000 replies, indicates that 67 per cent of all schools, public or private, teaching shorthand (which in at least 99 per cent of all cases means business style shorthand) are teaching Gregg shorthand.

Personal.— In the personal style field no accurate statistics are possible, largely owing to the lack of true personal style systems The nearest approach to a distinctive and rational personal style system in the past was Lindsley's Takigrafy, which attained considerable prominence during the last one-third of the 19th century, but has to-day largely disappeared. The only system alive to-day particularly designed to meet the exacting but little understood requirements of general personal use, in accord with the science of shorthand, is Personal Shorthand (Dewey), which is still too new to justify further comment at this time.

Pitmanic Shorthand Characteristics.— All Pitmanic shorthand is based on the original invention and subsequent modifications of Sir Isaac Pitman (1813–97), justly styled the father of modern shorthand. The distinctive characteristics of all Pitmanic systems include (see also comparative alphabets and specimens following):

(1) Detached vowel-group signs which are distinguished by the position in which they are written relative to the consonant stems. (2) A primary consonant alphabet of 24 stems, of which 21 are alike in all Pitmanic systems, composed of straight lines and circular curves, written on four different slopes and of two thicknesses (shading), but of one uniform length. (3) A secondary consonant alphabet of appendages, circles, hooks and loops, used under various conditions for alternative expression of the more common consonants, supplemented by further devices such as writing consonant stems one-half or double their normal length to imply other additional consonants, or writing outlines above, on or below the normal line of writing to indicate that an omitted vowel is one of a particular group.

Pitmanic Variations.— Of the many variant forms of Pitmanic shorthand which have been published, the Benn Pitman, Graham, Isaac Pitman and Munson are the most important in the United States, ranking in that order of numerical strength. In Great Britain, under more stringent copyright protection, the parent Isaac Pitman system is dominant, but in this country it is altogether secondary to the dominant Benn Pitman and closely related Graham.

The principal differences between the leading Pitmanic systems are: (1) Three conso-

nants, w y h, which are written: Benn Pitman, Graham, Isaac Pitman, Munson. (2) The relative positions of two pair of the dot vowels which are written

Benn Pitman, Graham, i ɪ a ɑ

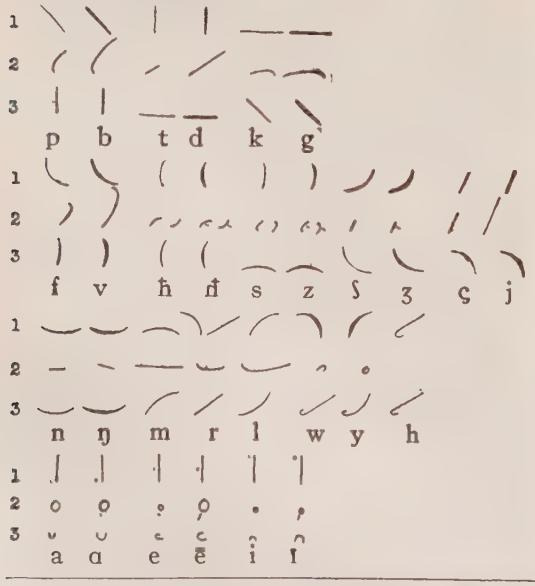
Isaac Pitman, Munson, a ɑ i ɪ

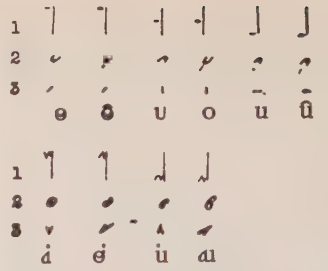
(3) Various minor details, especially with regard to the writing of small and large hooks on consonant stems.

Gregg Shorthand Characteristics.— The distinctive characteristics of Gregg shorthand include: (1) Joined vowel-group signs which are distinguished by detached diacritic marks; (2) A consonant alphabet composed of straight lines and elliptic curves, written on only two slopes and of only one thickness (non-shading); but of three lengths. (3) Conspicuous absence of those compound consonant devices which add complication on the one hand and power on the other in Pitmanic shorthand.

Personal Shorthand Characteristics.—The distinctive characteristics of personal shorthand include: (1) Joined vowel signs explicit without further distinction; (2) a consonant alphabet of straight lines and curves, written on four slopes, of two thicknesses (shading), and of one length; (3) compound consonant signs designed and used primarily for the true consonant compounds of English, especially those which occur before the vowel of their syllable.

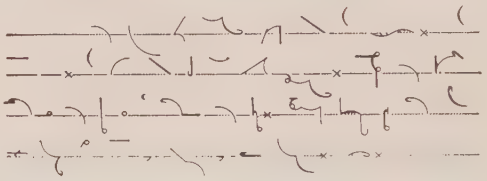
Comparative Alphabets.—The table following gives the basic alphabets of the three systems reviewed as most representative of the three styles of shorthand to be distinguished. The sounds of the shorthand signs are keyed by the N E A alphabet* (see PHONETICS), used as Key 1 of the New Standard Dictionary and its abridgments, the only phonetic key suitable for general popular use in English. (1) Benn Pitman Phonography; (2) Gregg Shorthand; (3) Personal Shorthand.



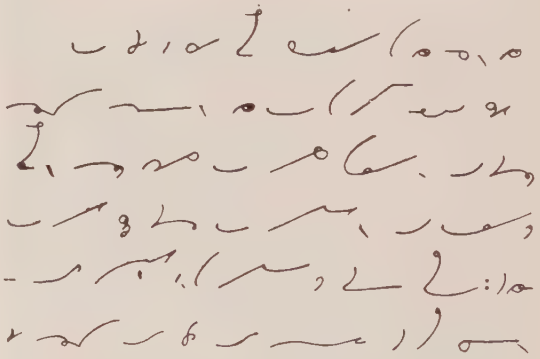


Comparative Specimens.— The specimens following give a familiar selection, the Lord's Prayer (Matt. vi, 9–13), in the reporting style of Benn Pitman Phonography, the business style of Gregg Shorthand, and the personal style of Personal Shorthand.

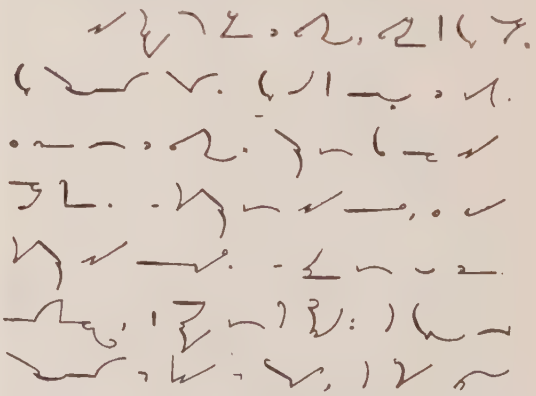
Benn Pitman Phonography reporting style



Gregg Shorthand business style



Personal Shorthand personal style



The best system of shorthand or the best style of a particular system is that style or system which best meets the requirements of the writer. The shortness and complexity of

*The type actually used to key the shorthand alphabets below is a simplification of the N E A alphabet by the author in harmony with shorthand practice.

a true reporting style is altogether unsuitable for general personal use. The simplicity and fulness of a true personal style is altogether impossible for reporting practice. The unsuitability of a business style for reporting or personal use differs nowise in kind but only in degree.

GODFREY DEWEY,
New York State Shorthand Reporters' Association.

SHORTHAND, History of. The early history of this art is closely allied with palæography, and it has been traced into the mists of antiquity. Antiquarians have tried to connect it with hieroglyphics and to show that it was used more than 1,000 years before Christ by the Persians, Egyptians and Hebrews. Abbreviated writing, to take down lectures and also for the preservation of poems recited at the Pythean, Nemean and Olympic games, was practised by the early Greeks, and there are specimens of ancient Greek *notæ,* or shorthand, in the Vatican Library, at Rome, the Bibliothèque Nationale, at Paris, and the British Museum.

Ancient History.—The definite existence of shorthand reporting dates in the century preceding the Christian era. Tiro, the accomplished freedman and amanuensis of Cicero, was in 63 B.C. the first known practitioner of the art. He reported speeches of his master, which were afterward revised by the orator; and as *notæ Tironianæ* became the established name for shorthand writing its invention was subsequently ascribed to him. At that period Rome was drawing from Greece her stores of learning and art, and Tiro's system was probably an adaptation from the Greek. Plutarch informs us in his life of Cato the Younger that Cicero distributed notarii (shorthand reporters) in various parts of the Senate House on the occasion of the vote as to the fate of Catiline, the chief purpose being to take down the speeches of Cæsar and Cato. The text of those speeches may be given by Sallust in his history of the Catilinian conspiracy, chapters 51–53, or the historian may have followed the example of Thucydides and embodied in them his conception of the character and policy of the two foremost senators. Mæcenas, the famous statesman, courtier and patron of literature, introduced some improvements in shorthand, and, according to Dion Cassius, instructed many in the art through his freedman Aquila. Seneca afterward increased the number of notations to a total of 5,000. Scalinger made a collection of the notes of Tiro, Seneca and others, which is appended to the great work of Janus Gruterus, published at Heidelberg, in 1603.

An illustrious German scholar, Ulrich, in 1817 analyzed the Tironian notes and his analysis shows that Roman shorthand, though a strain on the memory, answered the practical purposes of stenography quite as well as the systems in vogue in the early part of the 19th century, such, for example, as the one sketched by Charles Dickens from his own experience in the 38th chapter of 'David Copperfield.' We are informed by Suetonius that the Emperor Augustus taught the art to his grandchildren and that the Emperor Titus was a skilful stenographer. Martial, who lived in the time of Nero, has left an epigram upon a shorthand writer: *Currant verba licet, manus est velocior illis.* Among ancient papyri discovered 100 miles south of Cairo in 1903 by Professors Grenfell and Hunt, there is a contract with a writer of tachygraphy, made 137 A.B., whereby a slave boy was to be taught shorthand for 120 drachmæ ($24); 40 drachmæ were to be paid down, 40 more on satisfactory evidence of the progress of the boy and the last 40 when he had become proficient.

Shorthand seems to have been much used by the early Christians. It is supposed that Saint Paul dictated to amanuenses several of his epistles, notably that to the Colossians, where Tychicus acted as shorthand writer and Onesimus as transcriber. We know that Origen in the 3d century was assisted in the preparation of his 'Commentaries on the Scriptures' by clerks who wrote in shorthand from his dictation. Saint Augustine refers to an episcopal assemblage held at Carthage late in the 4th century, at which eight stenographers were employed in relays of two. About the same period the poet Ausonius praised a youth who could write faster than his master could dictate, and, with poetic license, even faster than he could think; and in another poem expressed his admiration of the skill of the stenographers of the time. Charlemagne, king of the Franks for 46 years and likewise Roman emperor during the 14 years preceding his death in 814, possessing an amount of learning unusual in his age, endeavored to become proficient in writing Tironian notes. But the *lingua Latina* was fast giving place to the *lingua Romana,* from which the modern Romanic languages of Europe sprang. At the Council of Rheims in 813, priests were admonished to address the people in the rustic tongue. Nor was a knowledge of the art confined to the Western civilization. A translation by Professor Flügel, of Dresden, from the Arabic, narrates how a Chinese in 923 A.D., who had acquired Arabic speech and writing in less than five months, took down in shorthand from the lips of his teachers 16 books of Galen.

Modern History.— The first modern shorthand work was printed in London in 1588 and dedicated by its author, Dr. Timothy Bright, to Queen Elizabeth. The first French publication, that of Jacques Cossard, appeared in 1651. The oldest German system was published in 1679. Gurney's is the oldest living system of English shorthand. It was first issued by Mason in 1672 and improved by Thomas Gurney in 1750. Taylor's system appeared in 1786, subsequent editions of which bore the name of Odell, Harding and so on. This system has a remarkable history of successful adaptation to Continental languages. Bertin adapted it to the French and Danzar in 1801 adapted it to the German language. Marti's tachygraphy was an adaptation of Taylor's alphabet to the Spanish language and was first published in 1800. By a royal ordinance in 1802 a chair for shorthand was established in the university at Madrid and Marti named as professor. The cortes of Cadiz first had an official shorthand report of its proceedings in 1810. Marti's tachygraphy was in 1828 applied to the Italian language by his son, who also adapted it to the Portuguese. Pereira had also, early in the century, adapted Taylor's alphabet to the Portuguese. The intro-

duction of shorthand into Mexico and the countries of South America followed these adaptations. Amanti, an Italian, adapted Taylor's shorthand to his own language and as modified by Delpino it is now used by the official corps of the Chamber of Deputies. The three prevailing French systems are those of Prevost, Duploye and Prépéan, the first named being a modification of Taylor. It is estimated that the bibliography of shorthand comprises 16,000 volumes, exclusive of reissues or editions. A valuable contribution to the English branch of this subject has been made by Julius Ensign Rockwell, published by the government as Circular of Information No. 2, Bureau of Education, Washington (1884), and Circular No. 1 (1893). The latter contains a reproduction of 112 English shorthand alphabets, extending from the first alphabetic system, that of Willis, in 1602, to the Duployan method adapted by Pernin in 1882. In 1888 'Light Line Phonography,' issued later as 'Gregg Shorthand,' was introduced.

A court of law in England in 1740 took the initial step in appointing an official shorthand writer. The next instance of the public recognition of shorthand in that country occurred in 1789, when the House of Commons, during the trial of Warren Hastings, called the shorthand writer to the bar and required him to read from his notes the exact words used by Mr. Burke, and thereupon resolved that Mr. Burke had exceeded his instructions in accusing Sir Elijah Impey of murder. The publication of Hansard's Debates was begun in 1803 and has become a general system of reports of representative bodies in Great Britain and her colonies. It is compiled from newspaper reports, supplemented by special reports. This system is closely followed in some of the colonies, as in New Zealand, while a method similar to that pursued by our national legislature has been adopted by the Canadian Parliament. The Hansard's report is semi-official, the speeches being submitted to members for revision and it is subsidized by the House of Commons. The official shorthand writing for the British Parliament is confined to the committee reporting, in which Pitman's and Gurney's systems have long had governmental recognition.

A census taken in 1914 of the systems of shorthand used in the Press Gallery of the British Parliament showed that out of 137 writers 128 wrote the Pitman system, 4 the Taylor system, 2 the Gurney system and 3 the Sloan-Duployan system.

The American colonies were not far behind the mother country in the use of shorthand. The Virginia Convention of 1788, called to deliberate on the ratification of the Constitution of the United States, was reported in shorthand in a meritorious manner by David Robertson, of Petersburg, Va., and in 1903 the National Shorthand Reporters' Association of the United States erected a tablet in Saint Augustine's Church, Philadelphia, to the memory of Thomas Lloyd, the official reporter of the National House of Representatives, 1st session 1st Congress. This tablet bears the following inscription:

Captain Thomas Lloyd, Author, Soldier, Patriot.
The father of American shorthand reporting.
14 August 1756 — 19 January 1827.

In 1834 Franz Xavier Gabelsberger, secretary to the Ministry in Bavaria, brought out his invention and in 1837 Isaac Pitman, of Bath, England, gave to the world the first edition of phonography or sound hand. Gabelsberger's system, with adapatation, has been widely introduced in Austra-Hungary, Switzerland, Russia, Denmark, Norway, Sweden, Finland, Poland, Holland, Belgium, Serbia and Rumania, although in some of these countries modifications of the Stolzean method predominate. Wilhelm Stolze published his system in 1841 and it is used in the Prussian Chamber, which is the sole exception to the official use of Gabelsberger's shorthand in Germany. In Russia a translation of Gabelsberger is officially employed in the imperial Senate, the Court of Cassation and other law courts. There was, of course, a gradual development of the art down to Isaac Pitman's invention. Dr. Bright's system was cumbrous and followed the vertical style of Chinese writing; but he indicated a present particle by two final dots just as Isaac Pitman nearly three centuries afterward denoted it by one.

Phonetics.— The phonetic principle was first applied to English shorthand by John Willis, in 1602, and it was further developed from time to time; but it remained for Isaac Pitman to make it a complete basis; in other words, to invent phonography or sound hand. As there are in the English language 43 distinct sounds, represented by 26 letters, Isaac Pitman adopted an extended alphabet by which consonants are indicated by simple geometrical strokes, straight or curved, the light sounds denoted by light strokes and the heavy ones by corresponding heavy strokes. The leading heavy vowels are represented by six heavy dots and a like number of heavy dashes, placed at the beginning, middle or end of the strokes and before or after as they precede or follow the consonants. The same course is followed with the light vowels. Diphthongs are provided for by a combination of dash forms and by a small semicircle differently formed and placed in different positions. Circles, hooks and loops are employed in distinct offices. As an illustration, the word *bought* is composed of three sounds represented by six letters. It is spelled phonetically *b aw t,* and in phonography it is written with two straight strokes joined, one sloping and the other perpendicular and a disjoined dash. In rapid writing the dash is omitted, as an important feature of the art in reporting is the use of consonant outlines, omitting vowels. It follows that shorthand is more readily adapted to a consonantal than a vowel language and for this reason French is easy and Japanese difficult. In every case, however, many brief forms, more or less arbitrary, are used for words of frequent occurrence.

Pitman System.— As has been stated, verbatim reporting in the English-speaking world dates from the invention of phonography by Sir Isaac Pitman. In recognition of his eminent service, the honor of knighthood was conferred on him by Queen Victoria. There was a celebration in London in 1887 known as the Golden Jubilee of Phonography, in which an array of talent was displayed which came as a surprise to men of letters on both sides of the Atlantic, who were unaware of the accomplishments nec-

essary to make the career of a shorthand reporter successful. Sir Isaac died in 1897, after having witnessed the introduction of phonography into every land that Anglo-Saxon civilization has penetrated. The inventor received great aid from his brothers, but that of his youngest brother was conspicuous and American. Benn Pitman came to the United States in 1853 and established in Cincinnati a phonographic institute and a publishing house, which are still in successful operation. For many years Pitman had an able associate in the person of Jerome B. Howard. In 1903 Benn Pitman having spent 50 years in the dissemination and development in the United States of his brother's invention, the National Shorthand Association, which met in Cincinnati, made an appropriate celebration of the golden jubilee of his labors.

The following is the complete alphabet of the Isaac Pitman system as presented in «Course in Isaac Pitman Shortland» (1918).

THE PHONOGRAPHIC ALPHABET.

(BY ISAAC PITMAN.)

CONSONANTS.

EXPLODENTS.				CONTINUANTS.			
P		B		F		V	
T		D		*TH*		TH	
CH		J		S		Z	
K		G		SH		ZH	
NASALS.	M			N		NG	
LIQUIDS.	L			R			
COALESCENTS.	W		Y	ASPIRATE.	H		

VOWELS.

	LONG.			SHORT.		
1.	AH	*as in*	*tah*	ă	*as in*	*pat*
2.	EH	,,	*tay*	ĕ	,,	*pet*
3.	EE	,,	*tea*	ĭ	,,	*pit*
1.	AW	,,	*taw*	ŏ	,,	*not*
2.	OH	,,	*toe*	ŭ	,,	*nut*
3.	OO	,,	*too*	ŏŏ	,,	*foot*

DIPHTHONGS. I OW OI U

To these brief elementary signs, which represent every distinct elementary sound in English, are added abbreviating adjuncts and principles that enable the hand to keep pace with thought. When Isaac Pitman invented his shorthand alphabet and with the assistance of distinguished educators and practitioners improved it, he had a three-fold object in view:

1. To give those who had memoranda to make, a more elementary method of writing, plain, simple, easily acquired in a few weeks, and capable of being executed at the rate of 50 or 60 words a minute.

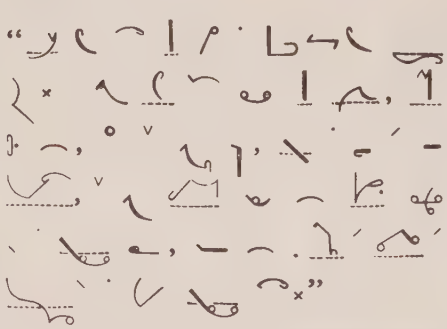
2. To develop a style of writing for the use of business men, ministers, physicians, authors, scientific investigators, and others who would acquire through a few months' study the ability to write 100 words per minute, with the ease of speech and the legibility of print.

3. To establish a system of reporting for those who sought to record the eloquent orations of public speakers at the rate of 300 words a minute when required.

How well the inventor succeeded in his realization of these first two resolves may be seen in the representation in the next column and the history of the dissemination of the art proves that this third has also been crowned with success.

Pitman's phonography has not only been successfully adapted to such languages as the Spanish and Dutch, but even to the Malagasy for official used in Madagascar, and in 1902 Edward Gantlett made an adaptation to the Japanese language under the title ‹Phonographica Japonica.› In Japan and China a method of tachygraphy is generally employed. The separate marks which united form a character in ordinary writing are made by a single stroke of the pen, the contours being traced regardless of details. In India, Navina, of the Punjab University, invented an alphabet of new Hindu characters, which is said to form the basis of a rapid and legible system of shortland. Other systems, based on Isaac Pitman's, have been introduced in the United States by Elias Longley, Andrew J. Graham and James E. Munson. Mr. Graham brought out the first edition of his ‹Standard Phonography› in 1858.

SPECIMEN OF ISAAC PITMAN SHORTHAND.



"I wish every man had such an education—every young man especially. And if either of my sons had lived, and I had trained him, as I should have tried to do, to be a great and good farmer, I should have wanted to send him at least six months to a Business School, to give him the aptitude and habits and forms of a thorough Business Man."

Horace Greeley.

Official Use.— The enlarged use of shorthand, owing to the demands of State legislatures, courts and the business world, is well known. The National Shorthand Reporters' Association has an executive committee composed of reporters from 35 States, 2 Territories and the District of Columbia. (See SHORTHAND STANDARDIZATION). The Senate of the United States in 1848 made a contract for a verbatim report of its debates and proceedings and the same course was adopted by the House of Representatives in the following year. Before 1848 the *Congressional Globe* contained an abstract of the debates and such speeches in full as members wrote or had specially reported. In 1873 Congress adopted the existing method and transferred the official publication of the proceedings from private contract to the government printing office. By this method each house employs a corps of five

reporters, the Senate paying to its corps $25,000 a year and the reporters of the House receiving $5,000 a year each. In addition, the House of Representatives employs a corps of official reporters of committees.

Shorthand has reached the highest possible development in every country where a parliamentary form of government has obtained. Turkey possessed no system of shorthand until her accession to the list of constitutional states, brought about by the reform movement of 1876. The Turkish Parliament met in 1877 and much difficulty was found in securing reports. Stenographers were employed to translate on the spot into French the speeches delivered in Turkish, but in this work the note-takers failed. The speakers were then required to reduce their remarks to writing before delivery; but it was found that such a rule could not be applied to a deliberative body. Efforts were then made to invent a stenographic machine, but this proved a failure there as elsewhere. Gabelsberger's system subsequently was translated into Turkish by Grünbaum.

The Continental countries of Europe, Great Britain and the United States now make instruction in shorthand a material and essential part of education.

CLARENCE A. PITMAN.

SHORTHAND, Science of. Shorthand Empiric.— Modern shorthand has developed from the earliest times down almost to the present day wholly as an empiric art, lacking those standards of measurement and accompanying definition of terms which constitute the first essential of any science — a striking anomaly in this scientific age.

Resultant Confusion.— As a direct consequence of this condition more than a thousand different systems of shorthand have been published for English alone, which for longhand has in effect but one. No less striking is the fact that those systems most prominent in the United States to-day differ not only in their specific alphabets and outlines and minor rules but also in their most fundamental conceptions of the nature and use of shorthand material — differences as marked as though the steam railroads of the country should run on one rail or three while the electric rapid transit of the cities ran on two.

Controversial Data.— This lack of recognition of scientific principles which, recognized or not, must underlie the practice of any useful art, has developed an immense mass of controversial literature, in which system A is compared with systems B and C, or system X with systems Y and Z, always to the latter's disadvantage — each document conclusive and final in itself, but each directly and irreconcilably contradictory to the other. The inevitable result of this futile recrimination has been to increase rather than decrease confusion and strife, and to make organized scientific progress impossible.

Efforts to Formulate Science.— Various attempts have been made in the past to determine the basic principles which, systematically related, constitute the science of shorthand as distinct from the practice of the art. Of these, the most noteworthy was the formation of The Shorthand Society in London in 1881, with the avowed purpose of "the study of the science and literature of shorthand and the investigation and discussion of the principles which should govern the construction of systems of shorthand and abbreviated longhand, adapted, if possible, for general use." The transactions of this society (50 numbers of the magazine *Shorthand*), which lasted for a dozen years till disrupted by the factional strife of system partisans, contain many sincere efforts to establish such basic general principles of shorthand — unfortunately in most cases too specific in their application to particular types of systems to have the general value for which they strove.

The outstanding feature of the society's efforts is undoubtedly the work of Edwin Guest, 1836–1919) which reached the point of propounding and roughly grouping 49 genuinely single and separate propositions and definitions under the general head of "Shorthand principles worthy of general acceptation," before further organized progress was suspended by the disintegration of the society.

Equally able and sincere though less detailed is the notable paper of Prof. J. D. Everett, "On the principles that govern the construction of a system of shorthand," read before the 1887 International Shorthand Congress at London. Various other statements have been put forth in the name of shorthand science, but with rare and fragmentary exceptions they prove on examination to be at best a list of unsubstantiated personal opinions, at worst a catalogue of personal prejudices.

Science of Shorthand.— The science of shorthand, presented before the 1918 convention of the New York State Shorthand Reporters Association, the oldest shorthand organization of America, as a part of the work of the Committee on Shorthand Standards marks the first systematically comprehensive formulation of the fundamental principles of shorthand science. It is an attempt to classify, define and where necessary discuss the single separate factors involved in the construction of any shorthand system, so far as they could be ascertained by reading, conference or original research; with out regard to their bearing on any particular system past, present or future. Although necessarily neither complete nor final it may be considered substantially correct as far as it goes and sufficiently complete to be accepted as a guide.

Structure.— The propositions of the science are classified under seven heads: 0 General considerations; 1 Phonetic or sounds; 2 Geometric or signs; 2:1 Assignment of signs to sounds; 3 Manual of writing; 4 Visual or reading; 5 Mental or remembering.

Each main head is subdivided into three classes: (a) Axioms and definitions — which should involve no scientific controversy at the present time; (b) Canons — which are considered proven or demonstrable but recognized as still subject to controversy in greater or less degree; (c) Theorems — put forward rather for discussion and investigation than for immediate acceptance.

The direct work of the science has been supplemented by extensive researches giving the relative frequency of every sound and the commoner syllables and words of English, and is being further supplemented by various experimental data on the relative facility of the possi-

ble signs and sign combinations of shorthand writing and their relation to penmanship technique. Much more remains to be done, but the work is going forward under the direction of the leading state and national associations.

Limitations.—Students of shorthand science will be struck by the absence from the science of any specific pronouncement on such leading questions of shorthand as: Whether to shade or not to shade stems; Whether to write stems on two, three or four distinct slopes; Whether to use the appendages for primary representation of vowels or for secondary representation of consonants. This is because such questions are not single separate factors of any shorthand problem, but are each a complex of a dozen or more important and inter-related factors, so that to pass judgment on such decisions would easily become dogmatic and enormously restrict the scope and usefulness of the science.

Purpose.—The purpose of the science of shorthand is to provide those standards of measurement and their accompanying definition of terms essential to scientific shorthand progress; to be used analytically to determine the strength or weakness of existing systems, or synthetically to determine the construction of future shorthand systems.

Specific Propositions.—A few of the more important propositions of the science, illustrative of the plan and scope, are given below. The complete series is accessible in the Proceedings of the New York State Shorthand Reporters Association. The first figure of each number refers to the main head noted above, the letter to the subclass. The second figure is a serial number in each subclass, for purposes of convenient reference.

0 a 4. No system of shorthand can conceivably be *best* in every important point, for several of the most important basic features are mutually incompatible. "Every fair minded person who has paid any attention to the relative merits of different systems, or who has himself tried his hand at system-making, knows that the best result can only be attained by judicious compromise. One advantage cannot be obtained in its highest degree without the sacrifice of other advantages, and no sound judgment can be arrived at by setting up one particular point of superiority as the sole test of excellence." (Everett.)

0 b 8. "Time, not space, is the proper measure of brevity." (Guest.)

1 a 1. The total number of different sounds in spoken English can no more be determined than the total number of different colors in the spectrum, and for the same reason—that they blend into one another by imperceptible degrees or shades.

1 a 2. A minimum number of sounds necessary to be distinguished for phonetic writing of English may be and has been conclusively determined. This minimum number is 40, counting diphthongs. (See table of comparative alphabets under SHORTHAND.)

2 a 1. The simplest conceivable material for graphic purposes is composed of right lines and arcs of simple curves, whether of circular, elliptic or other assumed origin.

2 a 6. The principal material for modifying or supplementing the simplest straight and curved stems consists of circles, hooks and loops, small and large, initial and final, and, in the case of straight stems particularly, right and left.

2:1 a 2. Latham's second law: "2 That sounds within a determined degree of likeness be represented by signs within a determined degree of likeness; whilst sounds beyond a certain degree of likeness be represented by distinct and different signs, *and that uniformly.*"

2:1 b 1. (Assignment of signs to sounds in a simple shorthand for general use.) Must not suggest by geometric similarities phonetic relations contrary to fact.

3 a 2. The relative ease of the various strokes which are possible material for shorthand writing will be profoundly affected by the muscles chosen to perform the principal effort and control of writing, and by the position of holding the pen or pencil. It is therefore essential that instructions for pen position and muscles to be used be adapted to each other, and to the genius of the system to be written; or, conversely, that in the construction of a shorthand system these points be determined in advance of its analysis of other data.

3 a 4. Other things being equal, a shorthand which employs symbols of *only* one length, one thickness or one position, will be more *facile* than a system employing symbols of more than one length, thickness or position. In practice, observation of all three of these restrictions would make impossible the condition of "other things being equal."

4 a 2. Other things being equal, a shorthand which, within the limits of clear distinction, employs symbols of *more than* one length, one thickness or one position, will be more *legible* than a system employing symbols of only one length, thickness or position.

5 a 1. "Rules should be simple, comprehensive, logical, and as nearly as possible free from exceptions." (Guest.)

5 a 2. The less of a word or phrase is expressed or implied the more of it must be remembered.

5 a 6. Arbitrary abbreviations are always objectionable, but are least objectionable in words of most frequent occurrence; for the double reason that their economy is so much the more valuable, and their meaning so much the more readily remembered.

5 b 2. Words are most readily recognized by their first elements, next by their last elements and least by their middle elements.

GODFREY DEWEY,
New York State Shorthand Reporters' Association.

SHORTHORN. See CATTLE.

SHORTHOUSE, shôrt'hous, **Joseph Henry,** English manufacturer and author: b. Birmingham, England, Sept. 9, 1834; d. London, March 4, 1903. After a secondary education at Tottenham, he became a manufacturer of sulphuric acid at Birmingham, but soon found his calling in literature, and privately printed a half-mystical work of fiction, *John Inglesant.* This was published in 1881, was much talked of and gained a solid success. Other works of his, such as *The Little Schoolmaster Mark* (1883–1884) and *Sir Percival* (1886), did not encounter a similar acceptance, but are greatly prized by thoughtful readers. Besides his fiction he wrote an essay on *The Platonism of Wordsworth* (1882). See also JOHN INGLESANT.

SHORTIA, a genus of plants of the Diapensia family, containing two species, one (*S. uniflora*), in Japan, and the other a very local plant, in the Allegheny Mountains. The latter species (*Shortia glacifolia*), is an interesting plant, historically, being closely associated with Dr. Asa Gray. When in Paris in 1839, Dr. Gray saw an unnamed specimen, with only leaves and fruit, in the herbarium of André Michaux, who stated that he had collected it in 1788, in the high mountains of Carolina. Dr. Gray afterward searched for it in that region, but was unsuccessful. He, however, described this plant, "with the habit of pyrola and the foliage of galax," and named it in honor of Dr. C. W. Short. The *Shortia* was afterward found (1877), although not in the locality mentioned by Michaux, but was in flower and was sent to Dr. Gray to verify his classification. In 1886, almost 100 years after it was first seen, and after much laborious searching, the *Shortia* was rediscovered by Dr. Sargent, in practically the identical region visited by Michaux. It has a creeping rootstock, a large tuft of long-petioled, evergreen leaves, with brownish stains, thin and serrate and shaped very like the galax leaves used in floral decorations. There are several flower scapes, some six inches tall, bearing solitary nodding, five-parted, bell-shaped flowers an inch long and wide, with white-fringed petals, blooming in the early spring.

SHORTITE, a new mineral discovered in 1939 as disseminated well-formed crystals in sections of a core taken from the John Hay oil and gas well, drilled in Sweetwater County, Wyoming, at depths of 1,250 to 1,800 feet below the earth's surface. It was identified by J. J. Fahey, chemist in the United States Geological Survey laboratory, and was named for Dr. M. N. Short, a former geologist of the survey; later professor of optical mineralogy at the University of Arizona. Shortite is composed of a double carbonate of sodium and calcium, and it is believed that it may be adapted to use in glass-making and ceramics work, should it be found in sufficient quantities.

SHORTT, Adam, Canadian political economist: b. near London, Ontario, Canada, Nov. 24, 1859; d. Jan. 14, 1931. He was educated at Queens, Edinburgh, and Glasgow universities; was professor of political science, Queen's University, for a number of years, and became Dominion Civil Service commissioner in 1908; created C. M. G. in 1911. He devoted himself to a study of Canadian economic and political development, and published a number of volumes relating to Canadian currency, exchange and finance, trade, etc.; including *Imperial Preferential Trade from a Canadian Point of View; Report on Railway Taxation for the Ontario Government; Documents Relating to Constitutional History of Canada, 1759–1791* (2 vols.); *Life of Lord Sydenham* (in Makers of Canada Series).

SHOSHONE FALLS, a waterfall of the Snake River (q.v.), in the south of Idaho, about 30 miles south of Shoshone. Above the falls proper, the cañon is about 750 feet wide and 1,200 feet deep. The waters are deep and flow with scarcely a ripple until the rapids are reached, when the water spreads out fan-like and drops over numerous precipices, some 50 feet in height, then, as it were, gathers its entire volume and plunges over a precipice 210 feet in height. Below this fall the cañon is about 1,000 feet in depth. Four miles higher up are the Little Shoshone Falls, a broken cataract of 182 feet.

SHOSHONEAN INDIANS are those who speak languages belonging to the Shoshonean stock of the Uto-Aztecan linguistic family. Many separate sociopolitical groups, sometimes designated tribes or bands, have been combined into four branches and eight divisions of the linguistic stock. The Plateau branch included the Mono-Bannock, Shoshoni-Comanche, and Ute-Chemehuevi divisions. The Kern River branch had a single division, the Tübatulabal. The Southern California branch included Serrano, Gabrielino and Luiseño-Cahuilla divisions. The Pueblo branch, the most distinctive linguistically and culturally, was spoken only by the Hopi of northern Arizona. With the exception of the Pima and Papago tribes of southern Arizona, whose affiliations were with Mexican Indians, all speakers of Uto-Aztecan languages in the United States belong to the Shoshonean stock.

Although some Shoshonean speaking peoples are separated from the main block, like the Hopi and Comanche, geographically the Shoshoneans belong to the semi-desert, basin and range, sagebrush region of the Great Basin, or more exactly the area between the Rocky Mountains and the Sierre Nevada mountains. Even though they reached the Pacific coast in Southern California and extended into the plains in Wyoming, their prehistoric aboriginal habitat was primarily the arid country of Utah, Nevada, southeastern Oregon, southern Idaho, southwestern Wyoming, and Southern California. It was about 1700 when the Comanche, Shoshoneans of Wyoming, received horses from the Spanish and guns and ammunition from the French, so that they could become raiders of the plains. At the opposite extreme of Shoshonean area, in southern California, the aboriginal way of life of the Serrano, Gabrielino, Luiseño, and other Shoshoneans who had reached the Pacific, was disrupted by the establishment of Spanish missions during the last three decades of the 18th century. The missions were established as follows: San Gabriel in 1771, San Juan Capistrano in 1776, Los Angeles in 1781, San Fernando in 1797. Although established in territory of Shoshonean speaking Indians, the missionaries brought together Indians of diverse speech and tried to convert them quickly to Christianity; consequently, ancient ways of life were lost before they could be fully recorded.

The Great Basin is the oldest known homeland of Shoshonean speaking Indians, and it appears that their migrations into the plains on one side and into California on the other began in this arid area of salt lakes. Inasmuch as Indians in this unattractive region were able to continue their aboriginal practices until the last half of the 19th century, aged individuals were living in 1940 who had participated in completely native Shoshonean culture. From old Northern Paiute, Shoshoni, Ute, Gosiute, and Southern Paiute Indians were received accounts of pre-European customs, beliefs and practices. It is difficult to imagine a people surviving with a simpler culture.

Dependent upon the resources of a very poor environment, for the Great Basin Indians had a hunting and gathering culture without domesticated plants or animals, except the dog, the Shoshoneans survived only by using everything

available. They ate insects, reptiles, and rodents, as well as the larger mammals, buffalo, deer, antelope, and mountain sheep, found in the mountains and more fertile valleys. Streams flowing from the mountains and disappearing into sandy basins, swamps, brackish and salt lakes furnished fish and water fowl. Wild roots, seeds, berries, and, especially, pinyon pinenuts, served as vegetable food. Shoshonean housing, always simple, varied with the products available from a tule and bulrush covered domed hut to a brush covered lean-to. Skin tepees appear to have been unknown in the Great Basin until after the arrival of the horse, for some places as late as 1860.

Political and social organization also varied with the environment. In more favored valleys a larger population allowed for a formal chieftain and rules of marriage and residence. Most of the Shoshoneans seem to have lived in individual family groups with an elder having only informal control. Except for avoiding incest between parents and children and between brother and sister, marriage depended upon circumstances. Polygamy, polyandry and monogamy were known. Wives were obtained by murder, stealing, war, exchange, purchase, loan, and courtship. The religion of the Shoshoneans was animistic and shamanistic. Shamans, who obtained power from personal spirits, could be good or bad, or even alternately curing shamans and witches. Mythology was the one aspect of culture which was rich, with many stories centering around Coyote and Wolf, powerful supernatural beings. Although Coyote was the highest of the gods, he was often depicted as a lecherous trickster.

Like the Comanche, many of the other Shoshoneans changed rapidly after receiving horses. The Ute of Colorado, for example, became nomadic hunters, traveling from their mountain homes to the plains to hunt buffalo. The material culture of the Colorado Ute came to resemble plains culture. A similar development occurred among the Windriver Shoshoni. The small Nevada Indian population was overwhelmed by miners and ranchers between 1870 and 1890, which partly explains the origin of two messianic cults. The two religious movements, called Ghost Dances, were started by Northern Paiute (sometimes called Paviotso) near Walker Lake, Nevada. Wodziwob was the prophet of the 1870 version which spread to California and his son, Wovoka (Jack Wilson), was prophet in 1890 and started the Ghost Dance which was enthusiastically accepted by the Plains Indians.

Kroeber (1939) estimates 50,300 was the total Shoshonean population in pre-Columbian times; subdivided as follows: Comanche, 7,000; Southern California, 20,000; Inter-mountain region, 20,500; Hopi, 2,800.

In 1950 the best population estimates for some and actual census for other groups give the following: Total Shoshonean, 24,015; Comanche, 2,694; Southern California, 2,700; Intermountain region, 13,787; Hopi, 4,834. Population records of some of the separate groups: UTE: 1870—4,000; 1885—3,391; 1909—2,014; 1930—1,980; 1950—2,455. NORTHERN PAIUTE (sometimes designated Paviotso, or Mono-Paviotso) including Bannock: 1870—8,000; 1910—3,451; 1950—3,895. SOUTHERN PAIUTE: 1870—2,527; 1910—1,079; 1950—938. GOSIUTE: 1870—256; 1920—152; 1950—229. COMANCHE: 1780—25,000; 1816—9,000; 1872—4,000; 1910—1,513; 1930—1,923; 1950—2,694.

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OMAR C. STEWART.

SHOSTAKOVICH, shŭ-stŭ-kô'vyĭch, **Dimitri,** Russian composer: b. St. Petersburg (Leningrad), 1906. While a student at the Leningrad Conservatory (1919–1925) he wrote his first symphony, the success of which encouraged him to undertake further symphonic compositions. His fifth (1937) commemorated the 20th anniversary of the October Revolution, while the seventh (1942) panegyrized the defense of Leningrad against German assaults. Other works include the operas, *The Nose* (Leningrad, 1930) and *Lady Macbeth of Minsk* (Leningrad, 1934; New York, 1935). He also composed several ballets, piano pieces, and music for Russian films. In March 1952 he received a 2d class Stalin prize for ten songs.

SHOTGUN, a small-arm with smooth bore, used for firing a charge of small shot in hunting wild fowl and small animals. It may have one barrel or two, and is called accordingly single-barreled or double-barreled. Two other types are recognized: the muzzle-loader and the breech-loader. The former type is no longer manufactured, but many such firearms of the olden time are still in existence, and hold their own in accuracy and effectiveness with the most carefully made modern weapons of this class.

The forerunner of the shotgun was the old-time blunderbuss, with its spreading wide-mouthed barrel devised to scatter its handful of miscellaneous missiles over as large an area as possible, with still enough striking force in them to accomplish its purpose. It had a range of about 100 feet. The shotgun of today has but little longer range (40 yards) but delivers its charge in a more condensed group and with the expenditure of considerably less powder.

The principal parts of a shotgun are the barrel, the frame and the stock. The necessity of having a barrel sufficiently strong to withstand the force of the powder explosion and at the same time provide a weapon not too great in weight to be comfortably carried about for a day's sport led to an ingenious plan by which the force released might be controlled by the greater lengthwise resistance of the fibres in a rolled bar. Wrought iron and steel strips were laid alternately and twisted together, and then wound in a close spiral around a rod-like mandrel. This spiral was then heated and welded into a solid tube, which was afterward bored out as to the inside and turned, "browned" with acid and polished on the outside, then presenting the peculiar grain which marked the "twist" or "Damascus" barrels so familiar a generation ago. The success of these light tubes in withstanding the sudden bursting pressure to which they were subjected developed another difficulty; the gun was too light to take up a sufficient part of the recoil to render its use agreeable. This fault was very quickly and happily remedied by adding another barrel, which not only

brought the weapon to an adequate mass, but afforded the huntsman the opportunity of a second shot.

Following the invention of breech-loading mechanism for rifles, this improvement was adapted to the shotgun by the device of «breaking» the barrels on a hinge-joint at the frame, so that the open butt of the barrel was presented for the insertion of the cartridge. The leaking of the gases of explosion, however, called for further improvement, and this was secured by the invention of an expanding shell for the cartridge. The force of the exploding powder automatically expands this shell so snugly into the breech chamber that all leakage of gas is prevented.

The next advance, the hammerless gun, was also the result of an improvement of the cartridge so that a centre pin could be used to explode the charge. The rim-fire cartridge thereupon disappeared and with it the projecting hammers.

Another important improvement of the shotgun had progressed contemporaneously with those already noticed; the introduction of the choke bore. While choke-boring had been invented as early as 1781, it was not definitely adopted until 1866. It consisted in contracting the gun-barrel slightly near the muzzle for the last few inches of its length — in some cases for five to eight inches, in other makes for two or three inches. Some gun manufacturers taper the choke to a conical form; others introduce a shoulder with gently rounding curves a few inches from the mouth; and there are several modifications of these practices. In the straight-barreled or non-choking gun only 30 per cent of the shot in the charge reach a target 30 inches in diameter at a distance of 40 yards. With the choke-bore barrel (other things being equal) 70 per cent of the shot is delivered upon the 30-inch circle. The explanations of this result have been many, but the one generally accepted is that the choke momentarily holds back the wad, and with it the forcibly expanding gases which otherwise have a tendency to scatter the shot laterally just as they leave the muzzle. Gun barrels are made «full-choke» or «modified choke.» In a 12-gauge gun the bore is 0.730 inch; with full-choke the mouth is narrowed to a diameter of 0.695 inch; with modified choke, to 0.716 inch.

The modern gun is of 10, 12 or 16 gauge, double-barreled, breech-loading and hammerless. It may have two triggers, one for each barrel, or but one trigger, a second pull on which fires the second barrel. The pull on the trigger is gauged from three to six pounds, less than three pounds being considered dangerous. The great majority of the American guns of the present day have barrels of forged steel. The bar from which a barrel is to be made is first rough-bored, then rough-turned on the outside and then straightened by hammering. It is then turned again and ground on a broad-faced stone. The lug is then brazed on. The inside of the barrel is then reamed out several times up to the choke, and this is shaped by special reamers according to the pattern desired. The two barrels selected to be associated in the double-barreled gun are tinned along their adjacent sides and blocks of metal are placed between them to keep them at the proper distance apart, the centre lines of the muzzles converging three-sixteenths inch for 30-inch barrels. The ribs are then soldered into the rabbets prepared for them. The stock of the gun is of walnut, Circassian walnut being favored for fine guns. The frame is of steel and serves to connect the barrels to the stock as well as to house the lock mechanism. The gun may also be a repeater, firing several shots in quick succession from a magazine lying under the barrels. A well-made gun of 12-gauge will weigh from five and one-half to seven pounds, depending upon the work expected from it.

Military Shotgun.— The military shotgun used by the American army in the Great War for night expeditions in «No Man's Land» and in clearing up trenches had a barrel 20 inches in length and carried a bayonet. It was of the repeating type, firing six times before reloading. The charge was of nine buckshot, and its shooting qualities are exceptional. Upon a life-sized manikin, at 30 yards all nine of the shot hit the target; at 50 yards the hits ranged from four to eight; at 80 yards, two to four hits; at 100 yards, always one hit and often two.

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SHOTWELL, James Thomson, American historian: b. Strathroy, Ontario, Canada, 6 Aug. 1874. He was graduated at Toronto University in 1898 and took his Ph.D. at Columbia University in 1903. He has been connected with the faculty at Columbia since 1900 and since 1908 has been professor of history there. He was assistant general editor of the 'Encyclopedia Britannica' in London in 1904–05. He also edited 'Records of Civilization' (20 vols.). Author of 'Sources and Studies' (3 vols., 1915–16). He was a member of the American mission which accompanied President Wilson to the Peace Conference in Paris in 1919.

SHOULDER-GIRDLE. See SHOULDER-JOINT.

SHOULDER-JOINT, the articulation of the upper arm or humerus with the glenoid cavity of the scapula or shoulder-blade. This joint is an example of the enarthrodial or ball-and-socket joints; the ball-like or rounded head of the humerus working in the shallow cup of the glenoid cavity. The head of the humerus is very large when compared with the glenoid or receiving cavity. The capsule which surrounds and encloses the joint is of very loose nature, but is intimately connected with the muscles which are attached to the head of the humerus. The joint itself is guarded against dislocation or displacement by the strong ligaments surrounding it, as well as by the tendons of its investing and other muscles; while superiorly the acromion and coracoid processes of the scapula form an arch, together with the coraco-acromial ligament, which further serves to protect the joint. The shoulder arch or girdle, also called pectoral arch or girdle, is in vertebrates

—in mammals, none above monotremes (see MONOTREMATA)—usually attached to the sternum ventrally, and to it the forelimbs are articulated. It has only an indirect connection with the vertebral column. Rudimentary or greatly modified in the majority of mammals, this girdle is especially marked in certain groups of birds. In man the clavicle is completely developed, and with the scapula this forms the bone structure of the shoulder girdle, which, relatively, is endowed with superior strength.

The articulating surfaces of the shoulder joint are covered with cartilage. The capsular ligament forms the chief ligamentous structure. It serves chiefly to support the inner and upper portion of the glenoid ligament, which is fixed around the margin of the cavity of that name. Its function is chiefly that of deepening the cavity by adding to its circumference, and it also protects the bony edge of the cavity. The motions of the shoulder joint are limited and controlled by the interlocking of the bones, as well as by the tension of the capsule. The biceps muscle, in the relations of its tendons to this joint, subserves several important uses. Primarily, and from its connection with both elbow and shoulder joints, it brings the movements of both into harmonious relation; while it strengthens the upper portion of the articular cavity and steadies the head of the humerus, through its relation to the bicipital groove of that bone.

This joint is liable to various diseases and injuries. Local injury may result in inflammation, while diseased conditions of constitutional origin may give rise to strumous or scrofulous disorders of the joint, to syphilitic lesions and gouty or rheumatic attacks. Of the accidents to which the joint is liable, dislocations are by far the most frequent, while fractures are not uncommon. Fracture of the acromion process of the scapula, of the coracoid process, of the neck of the shoulder blade and of the upper part of the humerus are of most common occurrence among these accidents.

SHOVELLER, or SPOONBILL, a freshwater duck (*Spatula clypeata*), distinguished by the bill being longer than the head and narrowed at its base, while the tip is hooked and broadened and its fringelike processes are long and slender. The average length of this bird is about 18 or 20 inches. The male has the head and upper neck bright green, and the lower neck white. The scapular feathers are white. The back is brown, the primary wing-feathers blackish-brown. The tip of the wing is pale blue, as also are the wing-coverts. The tail and upper tail coverts are black. The breast and belly are light brown or chestnut. It feeds on worms, insects, snails, small fishes and vegetable matters and inhabits lake-margins and marshy spots and breeds numerously all over the northern half of North America as well as in northern Europe and Asia, making its nest on the ground.

SHRADY, shrā'dĭ, **George Frederick,** American surgeon and editor: b. New York, Jan. 14, 1837; d. Nov. 30, 1907. He was consulting surgeon to the Saint Francis, the Columbus, the General Memorial and the Health Department hospitals in New York, and was consulting surgeon in attendance upon General Grant in his last illness. He edited the *American Medical Times* in 1860–1864, and in 1866 founded the *Medical Record,* of which he served as editor until his death.

SHRADY, Henry Merwin, American sculptor: b. New York City, Oct. 24, 1871; d. there, April 12, 1922. Graduating from Columbia (1894), he studied law, went into business and, finally taking up sculpture as an amateur, developed himself, without the direction of any teacher, into a professional sculptor. He was successful in a competition for the execution of an equestrian statue in Brooklyn ($50,000) in 1901; of the *Grant Memorial* for Washington ($250,000) in 1902. Subsequently he was commissioned by the Holland Society of New York to make an equestrian statue of *William the Silent.* His later works include equestrian statues of *General Williams* (Detroit); *General Lee* (Chancellorsville, Va.); *General Grant* (Washington), dedicated 1922.

SHRAPNEL. See PROJECTILES.

SHREVE, shrēv, **Henry Miller,** American inventor: b. Burlington County, N. J., Oct. 21, 1785; d. St. Louis, Mo., March 6, 1854. Early in life he engaged in navigation on the Western rivers, and in 1815 ascended the Mississippi and Ohio to Louisville, Ky., in the *Enterprise,* the first river steamboat. In 1820 he built the *Washington* of 400 tons burden; remodeled it in 1824, so as to operate each of the side wheels with a separate engine; invented the snag boat *Heliopolis* for removing snags from rivers, and in 1829 patented a steam battering ram for harbor defense. In 1826 he was made superintendent of improvements in Western rivers and continued in that office till 1841.

SHREVEPORT, city, Louisiana, seat of Caddo Parish, 18 miles east of Texas border on the Red River and on the Kansas City Southern, the Louisiana and Arkansas, the Texas and Pacific, the Illinois Central, the St. Louis and Southwestern, and the Southern Pacific railroads. The city has two airports, Barksdale Air Force Base, military, and a commercial port with airline service. Situated at an altitude of 179 feet in the northwest corner of the state, near the oil and gas fields of eastern Texas and southern Arkansas, and immediately surrounded by similar fields in Louisiana, Shreveport ranks high as an oil refining center and a distributing point. It has lumber mills, iron and steel foundries, railroad shops, cottonseed-oil mills, and plants producing sheet window glass, fertilizer, sheet metal products, and a wide variety of commercial goods.

Educational facilities include St. Vincent's College, with state-recognized teacher training courses; and Centenary College of Louisiana. The Shreve Memorial Library, like the city itself, is named for Capt. Henry M. Shreve. Barksdale Air Force Base is an air corps training station. Flood-control projects include an improved Red River channel, giving the city barge-line service over the inland waterway system. The city was founded about 1834, and was incorporated in 1839. The government is administered by mayor and council Pop. (1950) 127,206.

SHREW, one of the minute mammals of the family Soricidae and order Insectivora, particularly the common (*Sorex vulgaris*) and the

Lesser Shrew (*S. pygmæus*). The former are about the size of a mouse, which it somewhat resembles in the shape of the body, feet and tail, but has the muzzle produced far beyond the lip. The shrews have hairy mouse-like bodies and ordinary feet formed for running, and not for burrowing, as in the allied moles; the eyes and ears are comparatively well developed. They live on the ground, though a few are arboreal and others aquatic. The jaws are prolonged and a mobile snout generally exists. There are six upper and four lower incisors, the middle pair of the upper jaw being long and curved. The first lower incisors project horizontally and form with the upper ones a forceps-like structure for the grasping of small insects, which form the larger part of their fare. This family is much the largest one of the Insectivora and the numerous species are found in most parts of the world and present many interesting adaptations.

Within the limits of the United States four genera and about 60 species occur. In the typical genus *Sorex* the ears are large and of normal conformation and the feet are not fringed with stiff hairs. The common shrew is a frail little creature less than three inches long with a scantily-haired tail measuring one inch and may readily be distinguished by its prolonged muzzle and by the teeth being colored brown at their tips. It feeds upon insects and their larvæ and inhabits dry places, making a nest of leaves and grasses. The young, numbering from five to seven, are born in the spring. These little animals are very voracious in their habits and frequently kill and devour one another. *Neosorex* has large feet fringed with stiff hairs and includes the large water shrew, six inches long, as well as several other species. It lives in burrows leading to the water, which it enters in search of snails, etc., upon which it largely feeds. This species is found chiefly in the Rocky Mountain region and central plateau.

Blarina is a characteristically American genus with mole-like fur and the external ear well developed but turned forward in such a manner as to cover the opening and conceal itself among the hair. The short-tailed or mole shrew (*B. brevicauda*) is the best-known species of shrew in the eastern United States. It is about four and one-half inches long with a hairy tail measuring one inch. In general habits it resembles *Sorex*. During the winter it remains quite active and is frequently found on the surface of or burrowing in the snow. At this season it feeds largely on beechnuts as well as hibernating chrysalids and larvæ. It is a bloodthirsty creature and when confined attacks and devours its own kind as well as mice larger than itself. Like other shrews it has upon the knees and elbows glands, the secretion of which give it a peculiar and disagreeable odor.

Among interesting exotic species the following may be mentioned: the European and Asiatic water shrew (*Crossapus fodiens*) attains a total length of from four and one-half to five inches. The fur is of delicate texture and adapted to resist the action of water. A prominent fringe of stiff white hairs is found on the tail as well as the toes of this form, this fringe forming a distinctive feature of the species. The teeth are also fewer than in the American water shrew. The food resembles that of the common shrew, but aquatic larvæ and the young of fishes appear to form a large part of its nutriment. They are of very active habits, diving and swimming with great facility. The musk-shrew (*Crocidura cærulea*) of India is remarkable for the strong musky odor which emanates from glands situated on the sides of the body. It enters houses at night to feed upon cockroaches. Resembling the *Soricidæ* are the elephant-shrews (*Macroscelidæ*). They have the zygoma and auditory bulla developed and the muzzle forms a slender, proboscis-like organ with the nostrils at its tip. The eyes are of moderate size and the ears well developed and covered with hairs. The fore feet are short and possess five toes, while the hind legs and feet are very long and are provided with compressed claw-like nails. The tail is elongated and slender. The elephant shrews or jumping shrews are confined to Africa. The favorite attitude of these creatures is a sitting posture, much resembling that of the jerboas and kangaroos, and from the greater length of the hind as compared with the fore limbs they also, like these animals, progress by leaping. They inhabit dry rocky situations, feed on insects and other small Invertebrata and are nocturnal. Consult Dobson, 'Proceedings Zoological Society' of London (1890); Dobson, 'Monograph of the Insectivora' (London 1882–90); Merriam, 'Mammals of the Adirondack Region' (New York 1884); and Merriam and Miller, 'North American Fauna No. 10' (Washington 1895).

SHREW-MOLE, a large mole (*Scalops aquaticus*) inhabiting wet meadows and the borders of marshes and streams throughout most of North America. See MOLE.

SHREWSBURY, shrōz'bŭ-rĭ, England, the county-seat of Shropshire, on the left bank of the Severn, 42 miles northwest of Birmingham and 163 miles northwest of London. The town is unusually picturesque. The bridges are interesting features, four of them spanning the river, which here takes a winding course around the hills. The streets are narrow and steep and bordered by old frame houses. An archway of the period of James II and two towers of the reign of Edward I are parts of the old castle built by Roger de Montgomery. Saint Mary's, an interesting church of the 10th century; Saint Giles'— dates from the reign of Henry I; — Holy Cross, early Norman, and Saint Alkmonds are the most noteworthy churches. The other public buildings are public halls, museum, free library, market-house — including corn exchange — barracks and Royal Grammar School. The industries include foundries, tanning and brewing. Shrewsbury School, founded 1552, is one of the great public schools. Pop. (1942 est.) 44,860.

SHRIKE, or **BUTCHER-BIRD**, a bird of the passerine family *Laniidæ*, and especially of the typical group *Laniinæ;* several other subfamilies are not represented in North America. The true shrikes have the bill broad at the base, and hooked and toothed at the tip, resembling the bill of a bird of prey. A dense tuft of bristles surrounds the nostrils and others project from the base of the bill. The feet are small, and, except for the laterally scutellate structure, are of typically passerine type. The shrikes feed chiefly upon insects, reptiles, small

mammals and small birds and their young. About 200 species of shrikes are found in all parts of the world, and four species of *Lanius* within the United States. Other individual names are the Great Gray Shrike (*L. excubitor*), the Lesser Gray Shrike (*L. minor*) and the Red-backed Shrike (*L. collurio*), the latter, like *L. septentrionalis*, being often called the Nine-killer Shrike. The loggerhead shrike (*L. ludovicianus*) is the usual summer species of the eastern United States, where it is resident southerly and migratory in the North. These birds are seen usually in pairs flitting about the borders of woods and along fence-rows. The food consists chiefly of insects which the male is said sometimes to impale on thorns. They also attack the young of other birds. The nest is generally built in bushes and is of large size and composed of grass and weeds lined with hair and feathers. The eggs, usually five in number, are white, tinted with green and spotted with brown of various hues. The loggerhead shrike is eight or nine inches long, slate-colored above and plain ashy white below, with a black stripe through the eyes and meeting across the forehead. In the West it is replaced by two sub-species, the white-rumped and the California shrikes.

The Great Northern shrike (*L. borealis*) is found in the United States only in winter and breeds in British America. It is 9 to 10 inches long, marked below with numerous fine, wavy, dusky lines and the eye stripe is interrupted on the forehead. The nest is built in trees and the four to six eggs are similar to those of the loggerhead shrike. The song is harsh, but this bird possesses considerable imitative powers. The food consists of mice, shrews, insects and in winter especially of small birds. This species especially has a habit of suspending its prey upon thorns or fence splinters, or in forks of tree-branches. The significance of this remarkable habit is not understood. By some it is believed to be a storage of food; by others only an effort at convenience in eating the prey.

Closely related species of shrikes with similar habits occur in Europe and more distinct ones in other countries. The *Oreœca cristata* of Australia lives chiefly on the ground and is noted for its peculiar and somewhat ventriloquial song, which begins with low notes and gradually increases in height and power so as to delude the hearer into fancying that the songster has been gradually coming from a great distance toward him. It is sometimes called the bell-bird. The piping-crow (q.v.) and the pied crow-shrike (*Strepera graculina*), of New South Wales, represent a distinct sub-family. Various other birds have been named "shrikes," of which the most important are the bush-shrikes which belong with the ant-birds in the family *Formicaridæ*. Consult Gadow, 'Catalogue of the Birds of British Museum,' Vol. XV (London 1890); Evans, 'Birds' (London 1900); Newton, A., 'Dictionary of Birds' (New York 1896).

SHRIMP, a small decapod crustacean (see DECAPODA; CRUSTACEA) of the genus *Crangon*, allied to the lobster, crayfish and prawn. They inhabit sandy coasts and in Europe are caught for market in immense numbers by nets when swimming about near the beach at high tide. The familiar species, *C. vulgaris*, about two inches long, greenish-gray dotted with brown, is esteemed as an article of food. A related species (*C. franciscorum*) is found on the California coast where it has considerable commercial importance, being gathered and dried by the Chinese. The red color exhibited by shrimps when prepared for the table is the result of a chemical change during cooking, they being naturally translucent and colored much like the sand in which they live. A very great number of crustaceans more or less closely related to the shrimps live in the sea and a few in fresh water. Consult Stebbing, 'Crustacea' (New York 1903).

SHRINE, the case in which holy relics are kept. Shrines are usually richly ornamented with gold, precious stones and elaborate carvings. The earliest form of shrines was that of the diminutive model of a Gothic church with high-pitched roof. Some shrines, as that of Saint Alban, Britain's protomartyr at Saint Albans, that of Saint Edward the Confessor at Westminster, of Saint Genevieve at Paris, were imposing architectural structures. The shrine of Saint Charles Borromeo in the Duomo of Milan is of beaten silver faced with rock-crystal.

SHROPSHIRE, a breed of sheep (q.v.).

SHROUD, a word derived from the Anglo-Saxon «scrud,» a garment, and meaning more especially the winding-sheet in which it was customary to wrap the dead. This custom has been generally abandoned and the dead are buried in ordinary clothing, retaining to the last as far as possible the aspect they presented in life. The shroud has figured in many ghost stories.

SHROUDS, large ropes stretched from the heads of the lower masts to both sides of a ship, where they are fastened to the dead-eyes, which are secured to the channels, to support the masts, and named according to the masts to which they belong, the main, fore and mizzen shrouds.

SHROVETIDE, the three days between the evening of the Saturday before Quinquagesima Sunday and the morning of Ash Wednesday; so called because anciently people were wont on those days to make confession of their sins and to obtain absolution (to be *shriven*) in preparation for the season of Lent. The Tuesday of Shrovetide is called Shrove Tuesday; its evening was given up to merrymaking and to feasting on pancakes and fritters: hence the name Pancake-Tuesday or Pancake-night: in French Shrove-Tuesday is Mardi-Gras (q.v.).

SHRUBS are woody-stemmed plants of low stature. They often have several slender main stems and branch close to the ground, retaining these lateral shoots, which are lignified, and bear fruit repeatedly. The lines of difference between herbs and shrubs, and shrubs and trees, are arbitrary and difficult to define exactly. Undershrubs are those perennials which send up from underground stems annual shoots that do not become woody and die off in the autumn as do those of *Salvia pratensis*. A semi-shrub is practically the shrubby herb, whose yearly shoots become woody only at the base before the next period of vegetation and wither and die off above this. The small shrub is a low or even trailing plant like *Deutzia*

gracilis and *Epigaea repens.* When larger and much branched, the shrub is called a bush; and when so large as to resemble a tree, as the syringa often is, it becomes arborescent. Some of the shrubs are even climbing plants, like *Celastrus scandens,* the bittersweet, and certain roses. Like trees, shrubs may be deciduous or evergreen, and are often thorny. They are apt to grow in almost impenetrable thickets, with interwoven branches, and form fringes of vegetation on forest edges, in swamps, fields and moors. They are extremely useful to the horticulturist for their flowers and for their fruits, often of economic value; and to the landscape gardener, for concealing fences and buildings, and for softening the edges of tree masses.

SHUBRICK, shōō'brĭk, **John Templer,** American naval officer, brother of William Branford Shubrick (q.v.): b. Bull's Island, S.C., Sept. 12, 1788; lost at sea in the sloop-of-war *Epervier,* July 1815. He entered the navy as midshipman in 1806, served on the *Chesapeake* in her encounter with the *Leopard* in 1807, and in 1812 was promoted lieutenant. He was assigned to the *Constitution,* participated in her engagement with the *Guerrière* in 1812, and was on the *Hornet* during her engagement with the *Peacock* in 1813, receiving medals from Congress for his services. He was second lieutenant of the *President* when she was captured in 1815; and in the war with Algiers in that year, he was lieutenant of the *Guerrière,* the flagship of Commodore Stephen Decatur (q.v.), with whom he was engaged in all the operations against the Barbary powers. Upon the conclusion of peace he was commissioned to bear the treaty to the United States. He sailed in command of the *Epervier* early in July 1815, and was never again heard from after passing Gibraltar.

SHUBRICK, William Branford, American naval officer, brother of John Templer Shubrick (q.v.); b. Bull's Island, S.C., Oct. 31, 1790; d. Washington, D.C., May 27, 1874. He entered Harvard in 1805, but was appointed midshipman in 1806. He attained rank as lieutenant in 1813, was placed in command of a gunboat in Hampton Roads, was engaged in the defense of Norfolk and the navy yard at Gosport, and later in that year was transferred to the *Constitution.* He participated in the capture of the *Cyane* and the *Levant* by that vessel and was voted a sword by his native state and a medal by Congress in recognition of his services. He sailed around the world in the *Washington* in 1815–18, the first United States vessel to make that cruise, was appointed commander in 1820; and served until 1826 in command of the navy yards at Charlestown, Mass., and at New York. In 1826 he was appointed to the command of the *Lexington,* was commissioned captain in 1831, and in 1838–40 was in command of the West India squadron. He had charge of the Norfolk navy yard in 1840–43, was chief of the bureau of clothing and provisions for the navy in 1845–46; appointed in the latter year to command the Pacific squadron, he captured several ports during the Mexican War; in 1852 he was appointed to the Lighthouse Board. He was in command of the Atlantic Coast squadron for a time in 1853, and then resumed his duties as chairman of the Lighthouse Board; he remained in that post until his retirement, with the exception of 1858–59, when he was in command of the Brazil squadron and Paraguay expedition. He was retired in 1861, but remained on the Advisory Board until 1870; in 1862 he was commissioned rear admiral. Consult Maclay, Edgar S., *History of the United States Navy from 1775 to 1893* (New York 1894).

SHUFELDT, shōō'fĕlt, **Robert Wilson,** American surgeon and ornithologist: b. New York, Dec. 1, 1850; d. 1934. He studied at Cornell University, school of engineering, but withdrew in 1873 to study medicine at Columbian (now George Washington) University, where he was graduated in 1876, receiving the prize for the best thesis, *6000 observations on temperature of children.* He had seen service early in the Civil War; became surgeon with Generals Merritt, Crook and Sheridan in frontier Indian wars 1876–81. He was appointed curator Army Medical Museum, Washington, 1882; honorary curator Smithsonian Institution 1895; judge at the World's Fair, Chicago, 1893; honorary member Royal Australasian Ornithological Union and in 1914 elected by that society to be delegate British Association for the Advancement of Science, Melbourne. He was author of nearly 1,300 titles (10,000 illustrations) to books, memoirs, papers, and articles, devoted to ornithology, anatomy, and physiology of the vertebrata; osteology of birds, mammals and fishes; nature study, art, travel, photography, taxidermy, medico-legal studies, medicine and surgery, reptiles, fossil animals, zoological gardens and their management, psychology, sociology and popular botany. His books included: *The Osteology of Amia calva* (1885); *The Myology of the Raven* (1890); *Osteology of Owls* (1900); *Osteology of Herodiones* (1901); *Osteology of Pigeons* (1901); *Studies of the Human Form* (1907); *Osteology of Birds* (1909); *Review of the Fossil Fauna of the Desert Region of Oregon* (1913); *Further Studies of Fossil Birds, with Descriptions of New and Extinct Species* (1913).

SHUFU, shōō'fü, China, a city of Sinkiang, formerly known as KASHGAR. It is situated on the Kizil Darya River, 100 miles northwest of Soche (Yarkand), its position at the junction of several great caravan routes making it the emporium of much of the commerce of central Asia. Both the old and the new town, the latter built in 1838, are surrounded by mud walls and moats; the new town contains the palace of the former Chinese governor. Cereals, fruits, and vegetables are grown in the surrounding fertile district, much of it by means of irrigation. Carpets, and cotton, gold, and silver cloths are manufactured. It was the capital of an independent kingdom until conquered by the Chinese during the 18th century. In 1865 it revolted, but was again subdued in 1876–77. Pop. 80,000.

SHULL, George Harrison, American botanist: b. Clark County, Ohio, April 15, 1874. He was graduated at Antioch College in 1901 and took his Ph.D. at the University of Chicago in 1904. He was botanical expert at the United States Bureau of Plant Industry in 1902–04; assistant in plant physiology at the University of Chicago in 1903–04; botanical investigator at the stations for experimental investigation at Carnegie Institute, Washington, and at Cold

Spring Harbor from 1904 until 1915. He was professor of botany and genetics at Princeton University until 1942, when he became professor emeritus. He founded the magazine *Genetics.*

SHUMAGIN, shōō'mà-gēn **ISLANDS,** a group of islands located off the south coast of Alaska Peninsula, latitude 53° N. and longitude 160° W. The Danish explorer Vitus Bering (q.v.) and an expedition group landed here between two small islands on Aug. 30, 1741, finding Aleut tribes already inhabiting them. Ten men of the crew, ill with scurvy, were taken ashore. One of them, Nikita Shumagin, died almost immediately, and the crew named the island for him. Later the name was applied to the whole group of islands.

SHURTLEFF, Roswell Morse, American artist: b. Rindge, N. H., June 14, 1838; d. Jan. 6, 1915. He was graduated at Dartmouth College in 1851, and worked at lithography and drawing on wood till 1861, when he enlisted with the 99th New York Volunteers, of which he became lieutenant and adjutant. He was the first Union officer wounded and taken prisoner in the Civil War, July 19, 1861, and was not released until after nearly eight months' imprisonment. Illustration of books and magazines absorbed his efforts for many years; however, in 1870 he began to paint, executing numerous landscapes in both water and oil, largely transcripts of scenery in the Adirondacks. The Corcoran Gallery, Washington, D.C., acquired his painting *The First Snow;* and the Metropolitan Museum, New York, *A Mountain Stream.*

SHUSTER, George Nauman, American author and educator: b. Lancaster, Wis., Aug. 27, 1894. He graduated with an A.B. degree from the University of Notre Dame in 1915, and during United States participation in World War I he served at the front with the army's intelligence section. In 1920, after further study at the University of Poitiers, France, he returned to Notre Dame as head of the English department. While there he took his master's degree in French literature and in 1922, published *The Catholic Spirit in Modern English Literature.* In 1925, he became associate editor of the *Commonweal,* a newly founded weekly dedicated to religious principles. He served as managing editor of that periodical from 1929 till 1937, and meanwhile continued to write books, those at this period including: *The Catholic Spirit in America* (1927); *The Catholic Church and Current Literature* (1929); *The Germans* (1932); *Strong Man Rules* (1934); and *Like a Mighty Army* (1935). In 1932 he visited Germany as an Oberlaender Trust fellow and returned there during 1937–1939 with a two-year Carnegie Corporation fellowship. He wrote the notes for a translation of Adolf Hitler's *Mein Kampf* (1939) and, turning to fiction, published *Look Away* (1939). In 1940 he was appointed president of Hunter College, New York City. After World War II, he was one of a group of educators who visited Germany to report upon its educational needs.

SHUSTER, William Morgan, American lawyer and financial expert: b. Washington, D. C., Feb. 23, 1877. He was educated at the Columbian (later the George Washington) University, and in 1899–1906 was in the United States Customs Service in Cuba and in the Philippines. During 1906–1909 he was a member of the Philippine Commission and secretary of public instruction in the Philippine Islands. From May 1911 until January 1912 he was treasurer-general and financial adviser to Iran. He became involved in difficulties through his determined opposition to Russian intrigue in Iran, and was forced to resign, the circumstances at the time attracting worldwide attention. From 1915 until 1933 he was president of The Century Company, publishers located in New York City; and from 1933, president of The D. Appleton-Century Company.

SHUTE, Henry Augustus, American author: b. Exeter, N. H., Nov. 17, 1856; d. there, Jan. 25, 1943. He was graduated from Harvard University in 1879 and was admitted to the bar in 1882; from 1883 he was police justice at Exeter. He was known for his humorous books, chiefly delineating boy characters, but written for adults. His books included: *The Real Diary of a Real Boy* (1902); *Letters to Beany and Love Letters of Plupy Shute* (1905); *Real Boys* (1905); *A Profane and Somewhat Unreliable History of Exeter* (1907); *A Country Lawyer* (1911); *Plupy "the Real Boy"* (1911); *The Misadventures of Three Good Boys* (1914); *The Youth of Plupy* (1917); *Brite and Fair* (1918); *Plupy, the Wirst Yet* (1929).

SHUTE, Nevil, professional name used by Nevil Shute Norway, English aeronautical engineer and author: b. Jan. 17, 1899. At the outbreak of World War I he was an undergraduate at Balliol College, Oxford University. He saw active service in France, and after hostilities ceased he completed his studies at Oxford. In 1924 he became an aeronautical engineer, assisting in construction of the British government's airship *R100;* as chief engineer of the vessel he accompanied it on a voyage to Canada and back to England. He then turned his attention to aircraft construction, and was managing director of a large company in this field at the time he resigned in 1938 to devote his entire time to literature. His first books had already been well received: *Marazan* (1926); *So Disdained* (U.S. title *The Mysterious Aviator,* 1928); and *Lonely Road* (1932); these were followed by *Ruined City* (U.S. title *Kindling,* 1938); and *What Happened to the Corbetts?* (U.S. title *Ordeal,* 1939). This last book was a choice of the Book-of-the-Month Club, New York City; and the Literary Guild selected its successor, *An Old Captivity* (1940) for publication. After completing *Landfall; a Channel Story* (1940) he joined the Royal Navy for service in World War II, with the rank of lieutenant commander. He was employed at the British Admiralty. During the war period he published two more books: *Pied Piper* (1942), which was made into a motion-picture with Monty Woolley in the leading role; and *Pastoral* (1944).

SHUTTLE, an instrument used by weavers for shooting or passing the thread of the weft from one side of the web to the other, between the threads of the warp. It is a boat-shaped piece of wood which carries a bobbin or cop containing the yarn of the weft or woof. The shuttle sometimes has wheels to facilitate its motion.

SHUTTLEWORTH, Edward Buckingham, Canadian bacteriologist and chemist: b. Sheffield, England, 1842; d. June 24, 1934. He was educated at Dublin and at the Royal School of Mines, and, removing to Toronto, Canada, he became identified with the development of the chemical industry. In 1866 he was one of the founders of the Canadian Pharmaceutical Society, which later became the College of Pharmacy; he served it as dean and professor of chemistry in 1882–1891. He was also a member of the medical faculties of Victoria and Trinity universities, and of the Ontario Medical College for Women. He was city bacteriologist of Toronto before retiring in 1907.

SHYLOCK, a character in Shakespeare's *Merchant of Venice.* He lends Antonio, a merchant of Venice, 3,000 ducats on condition that in the failure to pay in three months the forfeit shall be a pound of the merchant's flesh cut off wherever Shylock chooses. His purpose is defeated by Portia, representing a young lawyer equipped with the opinion of Bellario, a learned doctor of Padua. Up to the time of Charles Macklin (q.v.), who played Shylock in 1741, the part had been represented by the low comedian, and was given a broadly humorous interpretation. Macklin invested it with tragic qualities and represented the Jew as a revengeful, inexorable moneylender. In 1814 Edmund Keane (q.v.) presented the part so as to elicit sympathy for one who was ill-used by circumstances. Modern opinion concurs in that he was the victim of a quibble and that even on the point of his conspiracy against the state his conviction was of doubtful propriety.

SI KIANG, sē kyäng (Chinese for West River), a river in southeast China, most important of those streams uniting to form the coastal delta on which stands Canton. It rises in Yunnan Province and flows in an easterly direction through Kwangsi, receiving many tributaries and in sections having differing names. The approximate length is 1,650 miles.

SIA, sē'ä, **INDIANS.** See Keresan.

SIAM. See Thailand.

SIAMANG. See Gibbon.

SIAMESE TWINS: b. Bangesau, Siam, May 1811; d. Mount Airy, N. C., Jan. 17, 1874. The name given to two individuals of Chinese extraction, named Chang and Eng, who from the manner of their physiological connection were regarded as examples of "anterior duplicity." They grew to be about five feet two inches in height, could walk, run, and swim. In April 1829 they were taken to the United States and exhibited throughout that country and later in Europe. They became American citizens, married two sisters in 1843, and finally settled at Mount Airy; they lived there until their deaths.

The original twins were succeeded by Rosa and Josepha Blazek, born in 1878 in Skerychov, Bohemia. They lived in Czechoslovakia and toured Europe in 1921. Then, visiting the United States, they contracted jaundice and died in Chicago, Ill., on March 30, 1922.

SIAN, sē'än', China, capital of Shensi Province, also known as Changan, Singan, or Hsi Gnan Fu, and by various other names. It is situated on the river Wei, in the central portion of the province. Kwan-chung, which stood on the site of Sian, was the capital of Shih Huang Ti (259–210 B.C.), fourth Chinese emperor of the Ch'in dynasty. The city became famous through the discovery in 1625 near the western suburban gate of the Nestorian monument, dated 781, a two-ton limestone stela, 10 feet high, with an inscription of more than 2,000 characters in Chinese and Syriac (Estrangelo). The inscription tells of the arrival in 635 of Nestorian missionaries from Syria, who were well received by Emperor T'ai Tsung. In 1907 the Danish explorer, Frits Holm (q.v.), set out to try to procure the tablet for science, but the mandarins at Sian caused the stone to be removed into the Peilin or Stone Coppice inside the city walls where it would be safe and under roof. The Holm expedition thus preserved the stela for all ages. The expedition later obtained a perfect limestone replica of the monument, 10 feet high and weighing two tons, which was brought to New York, where it was placed as a loan in the Metropolitan Museum of Art; subsequently it was moved to the Lateran, in Rome. "Ching-chiaopi" is the Chinese name of the tablet. Sian was again the capital of China for nine months, in 1900–1901, when the emperor and empress dowager fled thither from Peking during the Boxer troubles. In May 1949 Sian was captured by the Communists. Pop. (1936 est.) 188,291.

SIARGAO, sē-är-gä'ō, an island of the Philippines, 20 miles from the northeast coast of Mindanao; length, 20 miles, north and south; width, 14 miles; area, 176 square miles. It is traversed from north to south by a mountain range, the highest peaks of which are in the south. The northern, southern, and western coasts are paralleled by a reef lying three miles off shore; the ports on the coast are reached by natural channels through this reef. The island has seven towns, several hamlets, and a considerable rural population.

SIBBALD'S or BLUE WHALE. See Whale.

SIBELIUS, sĭ-bā'lĭ-ŏŏs, **Jean Julius Christian,** Finnish composer: b. Tavastehus, Dec. 8, 1865. During 1889–1890 he studied in Berlin under Albert Ernst Anton Becker (1834–1899), and for the next year in Vienna under Karl Goldmark (q.v.). In 1893 he was appointed a professor at the Helsingfors Conservatory, of which he later became principal. His work as a composer placed him at the head of living Finnish masters and he was regarded as a worthy successor of the greatest names in the history of Finnish music. Termed the founder of Finnish national music, his work is singularly free from the influence of foreign composers. His compositions were strong, passionate, mystic, and at times even weird, and not easy of comprehension to those unacquainted with Finnish character and history. He was thoroughly imbued with the music of the native folk songs, and while he never definitely followed themes of the folk music he rarely strayed away from its influence. Particularly was this noticeable in his use of five-four rhythm and of the repetition of single notes, both characteristic of the native music.

Among his works are symphonies in E and in D; 'The Swan Song of Tuonela'; 'Suite Karelia'; 'Kuolema'; 'Suite Pelleas and Melisande'; the Finnish opera 'The Maid in the Tower'; 'Valse Triste'; violin concerto in D, and many songs, symphonic poems, and pieces for piano and orchestra.

SIBERIA is broadly the northern Asiatic part of Russia east of the Ural Mountains and the Caspian Sea, extending uninterruptedly from the Urals eastward across 130° of the meridian to the Pacific Ocean, thus occupying the whole of northern Asia above lat. 50° N., lying mainly between 46° and 78° N. lat. and 60° and 190° E. long. Siberia is bounded on the north by the Arctic Ocean; on the east by the Bering Strait, North Pacific Ocean, Sea of Okhotsk and the Sea of Japan; on the west by the Ural Mountains and European Russia; and on the south by an irregular frontier line of over 6,000 miles separating it from Iran, Afghanistan and Mongolia. Siberia has a total area of 5,000,000 square miles. In imperial times Siberia was divided into governments and provinces. There were four of the former (Irkutsk, Tobolsk, Tomsk and Yeniseisk) and six of the latter (Amur, Kamchatka, Primorskaya, Sakhalin, Transbaikalia and Yakutsk). Many territorial regroupings took place following the second Russian revolution. The name «Siberia» is also used in a narrower sense to designate one of two distinct groupings of the autonomous areas and republics that go to make up the Asiatic domains of Soviet Russia: 1. Soviet Central Asia; and 2. Siberia.

1. Soviet Central Asia is bounded on the north by European Russia, the Ural Area, the Siberian Area, and the Oirat Autonomous Area; on the east by Mongolia and Tibet; on the south by Afghanistan and Persia; and on the west by the Black Sea and European Russia. It is composed of

Transcaucasian S.F.S.R.	Tajik S.S.R.
Uzbek S.S.R.	Kirghiz A.A.
Turkoman S.S.R.	Kazak A.S.S.R.

2. Siberia is bounded on the north by the Arctic Ocean, on the east by Bering Sea, the Sea of Okhotsk and the Sea of Japan, on the south by Mongolia and the Autonomous Kazak Republic, and on the west by European Russia. It comprises

Far Eastern Region	Siberian Region
Yakutsk Republic	Baskhir Republic
Buriat-Mongol Republic	Ural Region

The principal cities of the Siberian Region Proper are the capital, Novo-Sibirsk (population 120,701); Omsk (161,475); Tomsk and Irkutsk (about 100,000 each); Barnaul and Krasnoyarsk (about 75,000 each); and Buisk (46,000). The Siberian region, extending from the Arctic Ocean to Mongolia, has a variety of climate, with fertile agricultural districts, forest land, and sections adapted to industries of various sorts, particularly coal mining. There are rich coal areas, and iron and copper deposits.

Topography.—Siberia in its broader connotation is vast and diversified. Whereas the southwestern part is entirely lowland, the southern and eastern portions comprise considerable highland tracts. The coast line (19,300 miles) is very extensive, but the Arctic Ocean is ice-bound at least 10 months out of the 12 and is almost valueless for commercial purposes, while the Sea of Okhotsk, on the Pacific, is infested with masses of floating ice and dense fogs during several months of the year. Asiatic Russia in the extreme southwest is partly below the level of the ocean, and is drained either into the Caspian, or by the Amu Daria and Sir Daria into the Aral. A large part of this region is desert, and the soil is frequently impregnated with salt. Taking the meridian of 105° as a line of demarcation, two regions will be formed—a western and an eastern, exhibiting a very marked difference in the configuration of their surface. Both regions have their greatest altitude in the south, and may be considered as a vast inclined plane, sloping gradually north to the Arctic Ocean; but the eastern region is traversed in different directions by several mountain regions, whereas the western region, with the exception of the chain of the Ural on the western, and that of the Altaï on the southern frontiers, forms a vast plain, almost unbroken by any greater heights than a few hills and the banks of the rivers which wind across it. This plain, towards the south, has a height of about 2,000 feet above the sea, but toward the north is so near its level as often to become extensively inundated. The steppe, occupying the most elevated part of the plain, extends from the southern frontiers north to lat. 55°; and from the western frontiers, within these limits, east to the banks of the Irtish. The greater part of it consists of what is called the Steppe of Ishim, and has a bare and almost sterile surface, often incrusted with salt, but also occasionally covered with a scanty vegetation. The agricultural division extends northward to about lat. 60°. In many parts where it borders on the steppe, it has much of the same character, and has only occasional tracts which have been or can be advantageously brought under the plow; and in many other parts primeval forests are often found. Within this division, though not properly belonging to it, is the Steppe of Baraba, situated between the Irtish and the Obi. It has a more abundant vegetation than the Steppe of Ishim, which it otherwise resembles, and in its northern portion is covered with nearly continuous forests of birch and fir, haunted by numerous wild animals, including the beaver. From this the wooded division extends northward to lat. 64°, and in parts to 66°, though in the higher latitude the trees are seldom of very vigorous growth. The whole of this division is covered with vast forests of birch and different species of fir and pine. The population, few in numbers, are settled chiefly on the banks of the Obi and Yenisei, and live mainly on game and fish; the latter, including salmon, sturgeon and herrings, ascending from the sea as far as the confluence of the Tom. Wild animals also are very numerous, and many valuable furs are obtained. The last division is that of the moorland or tundra, consisting of a low monotonous flat covered with moss, and nearly destitute of trees. It extends along the shores of the Arctic Ocean, and has so rigorous a climate that even in summer ice is found a few inches below the surface. Here the reindeer exist in vast herds, both wild and domesticated; white bears and foxes are also numerous and furnish valuable furs; and the coasts and mouths of the rivers

are frequented by immense shoals of fish and flocks of fowl.

Siberia to the east of long. 105°, forming nearly one-half of the whole territory, has a much more diversified surface than the western region, and owing partly to its general ruggedness and elevation, and partly to the greater severity of its climate, has much less land adapted for agricultural purposes. The Sea of Okhotsk has a bold and rocky shore, and the country behind rises with a steep ascent till a mountain-range is formed, with a general altitude of nearly 3,000 feet above sea-level. This range, under the name of the Stanovoi Mountains, runs nearly parallel with the coast till it reaches the frontiers of China, where it takes the name of the Jablonnoi Mountains, and proceeding west continues for a long distance to form the boundary between the two empires. It then takes the name of the Mountains of Daouria, and throws out numerous ramifications, which, continuing west, throw their arms round Lake Baikal, and cover almost all the south part of the government of Irkutsk. Other ramifications, proceeding north, form the watersheds of the numerous affluents of the right bank of the Lena. On both sides of this river the surface continues elevated, and forms a table-land, the interior of which is still very imperfectly known. The best portions of eastern Siberia occur in the south of the government of Irkutsk, where, in the lower and more open valleys in the vicinity of Lake Baikal, cultivation has been attempted with success, and the oak and hazel, unknown in other parts of Siberia, are found growing freely. In almost the whole of the same government, where the configuration of the surface does not present invincible obstacles, all the grains of Europe are grown, and even the mountains and hills are covered during the greater part of the year with good pasture. Still farther north, in the government of Yakutsk, as far as the town of same name, corn is cultivated in patches in the upper vale of the Lena, though the far greater part of it is covered with fir and pine. The north part of eastern Siberia consists of two distinct portions, the one extending from long. 105° E. to the lower valley of the Lena, and the other from that valley east to Bering Sea. The former portion is imperfectly known: the latter, as far as the Kolyma, is traversed from north to south by chains of low hills, separated from each other by wide valleys or open plains, and generally overgrown with stunted larch and birch. In these valleys and plains are numerous lakes, generally well supplied with fish, and bordered by low banks, on which a rich grassy sward is often seen. To the east of the Kolyma branches from the Stanovoi Mountains stretch north, and form a series of ranges which frequently rise from 2,000 feet to 3,000 feet. Some of these penetrate to the north coast, and are seen forming precipitous cliffs at Shelagskoi Nos, Cape North, and other headlands. Other ramifications from the Stanovoi pursue an opposite course, and traverse the remarkable Peninsula of Kamchatka almost centrally to its southern extremity.

Hydrography.—There are numerous great rivers in Siberia. From the configuration of the country they almost all flow northward and belong to the vast basin of the Arctic Ocean. The chief exceptions are the Anadir and the affluents of the Amur in the east, and the Sir Daria, Amu Daria and other streams in the southwest. The great rivers belonging to the basin of the Arctic Ocean flow for the most part through immense tracts of level country, and hence are remarkable at once for the length of their course, the volume of water they accumulate and the few obstacles they offer to continuous navigation. But these advantages are offset by the long period during which they are frozen over, though even then they are available for traffic and become, in fact, the great highways of the country. The Obi is one of the largest rivers in the world; the length of its course is 2,400 miles and the area of its basin is 1,224,435 square miles. This system affords no less than 16,869 miles of navigable waters. Among its important affluents, many of them so large as to be entitled to rank as magnificent rivers, are the Irtysh, Ishim, Tobol, Tom, Tchulin and Ket. The Obi estuary forms a gulf of from 70 miles to 80 miles wide, and about 400 miles long. Large quantities of fish are taken in this river and its tributaries. The Yenisei, the second river in importance, draws its waters from an area of not less than 1,020,000 square miles. It rises in Northern Mongolia and flows north a distance of over 2,000 miles to the Arctic Ocean. Its most important affluents are the Selenga, which, before entering Lake Baikal, drains an area of more than 140,000 square miles; the Angara, which receives the discharge of the lake, and in the lower part of its course takes the name of Upper Tunguska; the Middle Tunguska, and the Lower Tunguska. The estuary of the Yenisei is about 20 miles wide, and 200 miles long. The Lena has a course of about 2,000 miles, and drains an area of about 800,000 square miles. It rises hardly 20 miles to the west of Lake Baikal, and becomes navigable at 50 miles from its source. Its principal affluents are the Vitim, which has a course of 700 miles, of which a considerable part is navigable; the Olekma, which flows 500 miles through interminable forests; the Aldan, which drains an extensive tract of table-land between long. 125° and 140° E.; and the Viliui, which rises in a mountainous district not far from the Lower Tunguska, and flows west for about 600 miles. The Amur, formed by the junction of the Shilka and Argun rivers, is, with its Argun headstream, about 2,800 miles long and covers an area estimated at 2,000,000 square miles. The Amur River system is navigable for some 8,000 miles. The most important of the minor rivers which send their waters directly to the Arctic Ocean are the Olenek, between the Yenisei and Lena; and to the east of the latter, the Indighirka and Kolyma. The only important lakes are those of Baikal, 400 miles long and in places 50 miles wide; the Sea of Aral, and Balkash-Nor or Tenghiz, in the southwest.

Geology and Minerals.—Granite and crystalline schists are found chiefly on the eastern slopes of the Ural Mountains, in the south among the mountain-ranges of the Altai as far north as lat. 57° N., and between long. 85° and 120° E., chiefly in the governments of Tomsk and Irkutsk, on both sides of the Upper Tunguska and east of the Yenisei; in the upper part

of the basin of the Middle Tunguska; and in the very eastern extremity of the country, from long. 165° to the shores of Bering Strait. The volcanic rocks belong mostly to the Tertiary period, and are found chiefly in the south, in connection with the granite and crystalline schists above mentioned. They compose the great mass of the mountain-range which skirts the western shores of Lake Baikal, and are seen in a still more magnificent and interesting form in the mountains which proceed from north to south, nearly through the centre of the Peninsula of Kamchatka, where are several active volcanoes. Palæozoic rocks, including the rocks belonging partly to the Silurian, partly to the Devonian, and partly to the Carboniferous systems, are developed chiefly in the south, where they occupy a large space in the form of a triangle, the apex of which is at the town of Irkutsk, and the base on the parallel of 60°, between long. 85° and 120° E. Another large development of the same rocks is seen on the northwest and north of the Sea of Okhotsk, and to a considerable distance inland. Secondary rocks higher in the series than the Carboniferous system commence near the northern shores of Lake Tenghiz, and stretch northward, occupying a considerable tract on both sides of the upper valley of the Irtish; a more partial development of the same rocks is seen on the north of the Obi, commencing near the confluence of the Ket, and extending north in a comparatively narrow belt to the sources of the Taz. The most extensive formation in Siberia is the Tertiary, which stretches almost continuously from the last slopes of the Ural Mountains east across the Obi to the valley of the Yenisei; and in other quarters, though more intermingled with earlier formations, covers no inconsiderable portion of the whole surface. The shores of the Arctic Ocean, almost throughout their whole extent, and to a considerable distance inland, have a deep alluvial covering, remarkable for containing deposits of fossil elephants and other animals in such quantities that the ivory obtained from them forms an important article of commerce. The minerals of Siberia are evidently of immense value, and though the real extent of surface on which they are found is as yet only roughly guessed at, there cannot be a doubt that the most precious of all the metals exists there in greater abundance than in any other part of the Old World. Till recently the auriferous deposits were supposed to be almost confined to the eastern slopes of the Ural Mountains, and to occupy a zone extending over from 5° to 6° of latitude to the north and south of Ekaterinburg; but it has been discovered that some of the eastern regions, particularly in the governments of Tomsk and Yenisei, are highly auriferous, and that a tract larger in area than the whole of France contains gold, not in its alluvia, but in the very matrix of its rocks of palæozoic schists and limestones, which, when pounded and analyzed, are found to be more or less impregnated with gold. The principal mining districts are those of the Ural already mentioned, the Altaï and Nertchinsk, in the basin of the Amur. Besides gold, of which Siberia has Russia's richest deposits, and platinum, of which new supplies have recently been found at the mouth of the Yenisei, iron, copper, zinc, silver, tin and lead are found in varied amounts. There are vast areas rich in coal and iron still unexploited. Among the more important minerals unearthed in Siberia must be mentioned the topaz and the emerald, at the famous mines at Nerechinsk.

Climate.—The prevailing impression that, climatically, Siberia is but a huge refrigerator, is absolutely erroneous. Being vaster in extent than the whole of the North American mainland, Siberia naturally possesses a great variety of climate — warm and hot, as well as the extremes of cold. Whereas the region between the Arctic Circle and the Arctic Ocean is a frost-bound waste growing only Arctic mosses and lichens—tobacco, cotton, even grapes and watermelons are successfully raised in certain parts of Southern Siberia; while residents speak enthusiastically of its beautiful springtime. And this is not to be wondered at if we remember that much of Siberia lies as far south as the States of Virginia and Kentucky, and that summer temperatures exceeding 100 degrees Fahrenheit are not uncommon there. Indeed, some travelers dread Siberia's peculiar summer heat more than its winter cold. The isothermal line skirting the southern coast of Iceland, in proceeding east, descends rapidly until it reaches Leningrad, and then more gradually till it reaches long. 100° E., where it is found in lat 52°. From this it proceeds nearly due east, passing through the southern part of Lake Baikal, the town of Nertchinsk, and the southern extremity of Kamchatka. Thus in proceeding from west to east the cold increases so much as to make places in the same latitude as Berlin to have a climate nearly as cold as Iceland. Erman found that annually between 17 December and 18 February, most frequently in the first three weeks in January, cold is experienced exceeding 90° F. below zero, and that for two months—a sixth part of the year—mercury is solid. This extreme winter is followed by a very warm summer. Thaw usually commences on the 1st of April, and the temperature increases rapidly till it attains its maximum in July. In this month the average height of the thermometer is about 66° F., but it not unfrequently rises in the shade above 77°. In Yakutsk, where the cold is severest, notwithstanding its long and extreme winter, there are 128 days in the year without frost; and within that period several kinds of grain, not excluding wheat, have time to attain maturity; and in rich alluvial soils often produce a return of fifteenfold.

Manufactures and Commerce.— The manufactures are limited, and are confined for the most part to a few of the larger towns, where government factories have been established. The more important articles are leather, earthenware, porcelain, glass and hardware. In some places, as at Telma, large woolen and linen factories employ a considerable number of hands, many exiles, in weaving woolen and linen cloth, and in conducting all the previous processes of preparing the wool, flax, etc. The trade is of considerable extent; and in so far as confined to the produce of the country consists chiefly of cattle, fish, caviar, furs, skins and metals. A very important transit trade is also carried on across the country between Russia in Europe and China. From the latter part by far the most important article is tea, both in the dried leaf and in the form of cakes

or bricks. The greater part of the latter is disposed of to the nomadic tribes, and a very large proportion of the former never passes beyond the limits of Siberia, but is retained for home consumption. Other articles of importance from China are coarse cotton stuffs, rhubarb, silks, satins, etc. The chief mart for this trade is the town of Kiachta, and extensive fairs are held at various places. For the interior traffic, the rivers afford remarkably good and cheap transportation ways, but their use is limited by their direction (all northward) and the shortness of their open season. Dog and reindeer sledges are therefore much in use. Great impetus was given to commerce and colonization generally throughout the region by the completion of the Trans-Siberian Railway (q.v.), the longest in the world, connecting the Far East with Europe by a 10 to 11 days' journey. A trade route by sea has also been opened between Europe and the Obi and Yenisei rivers.

Ethnology.—The races and tribes scattered over the different parts of Siberia are so numerous that little more can be done here than to give the names of the more important. The earliest inhabitants were probably the Yeniseians, who were followed by the Ugro-Samoyedes; these in their turn were driven out by Turkish tribes, who were ousted by the Mongols in the 13th century. The Trans-Siberian Railway has greatly stimulated Siberian immigration, so that the population of Siberia is largely Russian. Long before the railway days, all through the 19th century, there had been considerable Russian immigration to Siberia; over half a million in 1904 alone and 1,500,000 between 1890 and 1905. This constant and still flowing stream of free Russians had been fostered by the government since 1894; in addition, great hordes of exiles banished under the imperial regime for centuries, had swelled the population by some 865,000 between 1807 and 1899. Curiously enough, it was these exiles, far fewer in numbers than the free immigrants, that have branded the whole of Siberia with the undeserved, disreputable stigma that has marked it long after it ceased to be—in a few isolated parts only—a penal colony. Ethnologically, the Siberian natives present more varied and interesting types. Beginning at the Ural Mountains and proceeding eastward we find the Samoyedes in the northwest. Immediately south of them, the Ostiaks occupy both banks of the Obi, up to the confluence of the Irtysh, the northern part of the steppe of Baraba, and the whole of the woody region eastward to the banks of the Yenisei. They live by fishing and hunting, and though their physical structure is by no means robust, they display both great dexterity and courage in attacking the larger and fiercer animals, both of the land and water. Some of them have embraced Christianity. In the south, among the Altaï Mountains, the Kalmucks predominate. They subsist chiefly on the produce of their horses, cattle and sheep, and cultivate a little grain and tobacco. They have some skill in mechanical arts, especially in the working of iron, and make their own gunpowder. They are addicted to superstitions. Among the eastern slopes of the Altaï are several Turkish tribes. The Buriats dwell chiefly on both sides of Lake Baikal, and eastward as far as the Onon. They are of Mongol origin, and closely allied to the natives of the northern provinces of China both in language and customs. The Tunguz or Toongooses are the most widely dispersed of all the native tribes, being found throughout many parts of Siberia from the Arctic shores to the frontiers of China. They are considered the best-formed of the native Siberians, are very expert horsemen, and live chiefly by hunting. The Yakuts live intermingled with the Tunguz, and confine themselves almost entirely to the rearing of horses and cattle, and the preparation of dairy produce from them. They are of Tartar origin, and not a few of them are nominal converts to Christianity, though the majority, like the Tunguz, still adhere to Shamanism. The Tchuktches occupy the northeastern portion of Siberia, and their language proves them to have a common origin with the Eskimos. Some of them spend their time in hunting and fishing, while others are nomadic in their habits. Interesting and valuable information on these tribes was collected by the Morris K. Jesup Expedition which returned to the United States in 1904.

History.—Siberia appears to have been partly conquered by Ghenghis-Khan and his successors, but did not become known to Europe until 1580, when a Cossack called Ermak Timofeev, who had long robbed the vessels which navigated the Volga, finding himself hotly pressed by the czar of Moscow, crossed over into Asia with his accomplices. Their number sufficed to form a small army, and their courage soon enabled them to acquire extensive settlements. These Ermak offered to the czar on the condition of obtaining pardon. The offer was accepted, and thus Russia for the first time obtained a footing in Asia. The territories thus conquered belonged to the Tatar prince Kutshum-Khan, and included his residence, which, called by the natives Isker, and by the Cossacks Sibir, has given name to the whole country. The conquests of Ermak were gradually extended, until the whole country west of the Obi was subjected to the czar. In 1604 the town of Tomsk was founded, and became a center from which new expeditions were fitted out and new conquests made. Private adventurers, instigated chiefly by the hope of plunder, proceeded in all directions to the south, where, not without serious reverses, they succeeded in expelling the Kirghiz; and to the east, where they entered the basin of the Lena, subdued the Yakuts, and finally, after passing the Aldan Mountains, reached the Sea of Okhotsk. In the neighborhood of Lake Baikal a formidable resistance was made by the Buriats, but their subjugation was finally completed in 1658. The town of Nertchinsk, which has since become so celebrated for its mines, was then founded, and, two years after, that of Irkutsk. A further extension of conquests to the south brought the adventurers into collision with the Chinese, and both governments taking part in the quarrel, a war, threatening the existence of one or other of the empires, became imminent. It was, however, prevented, partly by the intervention of the Jesuits resident at Peking, and a treaty in 1689 definitely fixed the boundaries of the two empires. A second treaty in 1727, confirming the former, regulated the commercial intercourse and confined it to the two localities of Kiachta and Maimachen. Never has so large a territory been acquired at so little expense. Russia, almost without any expenditure of her own means, and chiefly by the aid of a few Cossack adventurers, in little more than a cen-

turv more than doubled her area. An enormous part of it indeed is a frozen inhospitable region, which must always remain comparatively worthless; but vast tracts possess a climate and soil well adapted for agriculture, and seem destined to become the abodes of a dense population engaged in agriculture, mines and fisheries.

With the building of the Trans-Siberian Railway (1891–99) emigration from Russia to Siberia became easier and was patronized by the government. Whereas in former times the annual influx of new settlers was from 20,000 to 30,000, with the opening of the railway it rose at once to from 150,000 to 200,000. During the Russo-Japanese War it was interrupted, but many Russian peasants who had been called up for military service then first made acquaintance with Siberia. No sooner was the war over than the wave of emigration rose to an unprecedented height. In 1907 the number amounted to 576,979; in 1908 there were 758,-812; in 1909 there were 707,463. Since then emigration has progressed, though reliable statistics are not available. The advent of labor and money, and the establishment of new farms has transformed all the old conditions of the country. Even the nomad Kirghiz have been aroused from their lethargy by the gradual narrowing of pastures and have taken to plows and reaping-machines. New towns have arisen in Siberia, new industries have started; the Zemsto system was introduced in 1905, while a uniform system of public justice—in place of the existing arbitrary administration of autocratic officials—was instituted in 1897 by order of the ex-Tsar Nicholas. Trial by jury was not conceded but the justices were appointed by the Crown. The higher tribunals consisted of eight circuit courts in the towns of Tomsk, Tobolsk, Chita, Krasnoyarsk, Irkutsk, Yakutsk, Blagovestchensk and Vladivostok, with a court of appeal above these stationed at the provincial capital, Irkutsk. The Soviet system now obtains. A sea route through the Kara Sea to Siberia has in recent years been opened up, chiefly by British enterprise.

Siberia has an unenviable record owing to its famous convict settlements. It was in 1710 that Peter the Great first began exiling inconvenient political opponents to the bleak steppes beyond the Urals, but it was not till the first quarter of the 19th century that it became a common practice to deport criminals to Siberia in addition to political offenders. In later years a stream of emigration was directed thither and encouraged. While those prisoners who were regarded as dangerous were chained and forced to work in lead mines, those accused of minor offenses (who were frequently accompanied by their families and friends) were permitted to live in comparative freedom, running stores and workshops on their own account. Some European visitors have even brought back stories of female political exiles who had their own pianos and read the latest French novels. The squalid horrors of the convict system are described in numerous travel books and especially in Russian fiction.

The tangled skein of events that developed in Siberia between the period of the Russian Revolution in March 1917 and the summer of 1919 presents a confusing panorama, of which it is only possible here to give a more or less approximate description. In a sense the Siberian imbroglio of 1918–19 was not so much a part of the Great War as a side issue that arose from it and from the Revolution. It may better be described as a civil war accompanied by half-hearted experiments in foreign intervention. Beginning as a struggle in favor of the Allies after the military collapse of Russia, it developed into a far-flung campaign against Bolshevik rule. In the early stages of the European War whole regiments of conscript Slavs — Czechs, Slovaks, Croats and Poles — in the Austro-Hungarian army deserted over to the Russian side. Though living under foreign dominion for centuries, these races had clung tenaciously to their national culture and languages. Their sympathies in the war lay with their Slavic kinsmen in Russia as against the Central Powers. Out of these deserters a Czecho-Slovak division had been formed after the Revolution and incorporated with the Russian army. It played a gallant part in the last offensive that Brussilov was able to direct against Austria before Bolshevism succeeded in demoralizing the Russian troops and navy. The Czecho-Slovaks, however, insisted on continuing the war, and demanded to be sent to France to join the Allies. The Bolshevik rulers were willing that they should leave Russia, and in February 1918 they were granted a passage to Vladivostok; but before their removal could be effected Trotzky had concluded the Brest-Litovsk Treaty with Germany (3 March 1918) and the bulk of the Czecho-Slovaks, some 50,000 at that time in the Ukraine, found themselves in danger of falling into German hands. Refusing to make peace and unable to face the German advance, they decided (after rejecting Austrian overtures to return home and be forgiven), to retreat over the railroad to Moscow and make their way thence across Siberia, across the Pacific Ocean and America to France. Hunted by the Germans, they fought a four days' battle at Bakhmach, 125 miles northeast of Kiev, defeating them severely. Under tremendous difficulties they continued their amazing journey eastward; they cut their way through and, to prove their loyalty to the government then in being, surrendered most of their equipment to the Bolsheviki, leaving also hundreds of automobiles and air planes to the Germans. Though betrayed time and again by Bolshevik treachery, their wounded murdered, attacked daily by Red Guards and Austro-German prisoners led by German agents, they at first steadfastly refused to fight against Russians and to interfere in Russian politics. After 56 days' of toil and hardships, the vanguard of this modern "Ten Thousand" completed its "Anabasis" and reached the Pacific — one of the greatest military achievements in history. Other detachments of Czecho-Slovaks remained in western Siberia and on the road to Archangel.

On 14 March 1918, Mr. A. J. Balfour pleaded in the House of Commons for Allied assistance in Siberia against the growing menace of German penetration owing to the presence of some 94,000 Austro-German prisoners of war east of Lake Baikal, and 60,000 to the west of the lake. He strongly defended the loyalty of Japan to her allies and suggested that that country should be invited to intervene "as

friends of Russia and enemies of Germany, to preserve the country from German domination.» The Japanese Foreign Minister, Baron Goto, stated on 1 May that «Japan must give encouragement, assistance and support to the work of reorganization» in Russia and «preserve peace in the Near East.» Negotiations between the Allies followed at length while events shaped their own course in Siberia.

To return to the Czecho-Slovaks. The Bolsheviki had promised them a «safe conduct» and transportation, neither of which materialized. Acting under German pressure, Trotsky ordered them to be disarmed. This was forcibly attempted in May, when the Czechs resisted and attacked the Bolshevik troops both in Europe and in Siberia, captured several towns on the Volga during June, occupied Samara and advanced to Ufa in the Ural region. They seized control of the principal grain routes, thereby cutting off the food supply from Siberia. Scattering the Bolsheviki before them, they fought their way along the Siberian Railway, and by July were in possession of the line from Chelyabinsk in the Urals to Krasnoyarsk, a distance of over 1,300 miles. Meanwhile, a large contingent of Czecho-Slovaks had arrived in Vladivostok, the eastern terminus, from which point they began operating westward to effect a junction with their comrades. The Bolsheviki were driven out of Vladivostok and Irkutsk by the end of June. The Czechs entered the Amur region and occupied several towns, and by the middle of July nearly the whole Trans-Siberian Railway was in their hands. In each of the towns at which they arrived they found a Soviet local government of Workmen's and Soldiers' Delegates, in other words, Bolshevik rule. Each of these was immediately overthrown, at which task the Moderate Russians or anti-Bolshevists heartily assisted.

After the Bolsheviki had dispersed (January 1918) the Constituent Assembly in Moscow, many of the members made their way into Siberia, where they secretly maintained their organization under the Red rule. The coming of the Czechs gave this group their chance. Its members established the Temporary Siberian government at Omsk on the ruins of Bolshevism in central Siberia in June and began to organize a Russian anti-Bolshevist army. Other governments sprang into existence later on: General Horvath, director of the Chinese-Eastern Railway, established a provisional government at Harbin; General Semënov founded one in Chita, and Avksentiev created the Ufa Convention, while yet another Siberian government arose at Novo-Nikolayevsk in western Siberia. A branch of the Omsk government was set up in Vladivostok. Before long trouble arose between this multitude of «independent governments,» each claiming either «All Russia» or «All Siberia» as within its jurisdiction. Allied influence was exerted to settle the local rivalries. By arrangement the Ufa Convention was dissolved and merged in the Omsk government, under a directorate of five members: Avksentiev, Vinogradov and Vologodsky (Socialists), Astrov (Cadet), and General Boldereff (non-party), as commander-in-chief. Admiral Kolchak was appointed Minister for War and Marine; 10 other ministerial posts were created, for Foreign Affairs, Interior, Finance, Justice, Communications, Munitions, Labor, Commerce, Supplies and Education. Political intrigue soon made its appearance among the central committee which threatened to lead to confusion and disintegration when the council of ministers decided to take the authority of the Directorate into its own hands. Soon after his appointment Admiral Kolchak proceeded to the front on a tour of inspection. Just at that time the Czech commander had invited the British 25th Middlesex Battalion to attend the presentation of colors to the Czech regiments at Ekaterinburg in the Urals, and Col. John Ward, an English Labor member of Parliament, had accepted for the band and 100 men of his battalion. Railway traveling being a difficulty in Siberia, the admiral's carriage was attached to the British troop train, and Colonel Ward offered his men as the admiral's escort for the whole trip around the front. Thus it happened that the Russian War Minister inspected his troops with no other guards than British soldiers, who duly accompanied him to the front and marched up to the outpost line with the band playing 'Tipperary.' The tour ended abruptly at Chelyabinsk; instead of going west to Ufa according to program, the admiral and his escort suddenly turned east at top speed for Omsk. On the road they encountered a special train bearing General Boldereff, who held a long private consultation with Kolchak. On the morning of 17 Nov. 1918 they were back in Omsk, and that same night Avksentiev, two other members and the chief of police mysteriously disappeared. Next morning the streets were alive with troops. A batch of officers had spirited the administrators away during the night. There was little doubt that the military party meant shooting. Colonel Ward immediately wrote a bluntly-worded letter to the admiral intimating that British public opinion would regard with profound disapproval any attempt to deal with the arrested men except by proper trial. Kolchak at once gave the required assurances, and two days later the four men were entrained for China under a joint British and Russian guard, and with the train flying the British flag as a precaution. With Boldereff perspicaciously absent and the extreme Socialists arrested there remained but two of the Directorate, Vologodsky and Vinogradov, who promptly resigned their offices and the Directorate became extinct. The council had now to decide whether to retain power itself, which virtually meant a resuscitation of the Siberian government, or to vest it in something or somebody else. The whole procedure was no doubt cut and dried in advance. The council formally assumed the power, fallen upon it by the disappearance of the Directorate, and immediately offered it to Kolchak with the title of «Verkhovnü Pravitel» (Supreme Administrator), virtually dictator. Kolchak accepted, thereby completing the *coup d'état*.

Already in April 1918 some British and Japanese marines had been landed at Vladivostok to maintain order. A Chino-Japanese agreement (16 May) assured the co-operation of China to combat German penetration in Siberia. Early in August a small British force landed at Vladivostok to co-operate with an American

detachment and a larger Japanese force; active intervention had been decided upon after lengthy negotiations between the Allied Powers. Declarations were formally made by the American and Japanese governments that the movement of Allied troops into Siberia was not an act of hostility against the Russian people, but an intention to assist them. The Allied force was placed under the command of the Japanese General Otani; besides those already mentioned, his force consisted of French, Italian, Serbian and Rumanian units. Maj.-Gen. W. S. Graves was in command of the American contingent, consisting of two regiments from the Philippines. A British plenipotentiary for Siberia was sent from Hongkong. The Bolshevik government declared the Allied intervention in Siberia to be an act of war against Russia while the Moderates welcomed it as the only feasible measure to crush Bolshevism and to disabuse the Germans of the idea that the road eastward lay open to them. In the fighting along the Siberian line the Czechs and the Russian White Guards gained numerous successes over the Bolshevist forces. In the Far East, however, the operations of the Allied armies did not for some time extend beyond the Amur and Ussuri province north of Vladivostok. By the middle of August 1918 the situation became complicated. The Czechs held the line from the Urals to Irkutsk; the Allies controlled part of the Ussuri region. Between the two lay a formidable army of Bolsheviki and former Austro-German war prisoners, all well equipped and led mainly by German officers. Other detachments of Czechs, still further west in Russia itself, were hard pressed, while neither the British from the Murmansk expedition nor small forces operating from India up through the Caucasus and Transcaspia, were near enough or strong enough to effect a junction. Even in Ussuri the Czechs were in peril until the Allies and a Cossack force under Semënov were able to reach them. The Japanese captured Khabarovsk (8 Sept. 1918), the base on the Ussuri Railroad of the Siberian Bolsheviki, who then withdrew to Blagoveshtchensk. They were cleared from the railway between Lake Baikal and Manchuria and communication was finally established with the Czechs to the west, though it was for some time impossible to relieve the pressure against them. The Bolshevik army indeed grew ever stronger. Americans and Japanese captured Blagoveshtchensk (14,000 prisoners) and Alexeievsk on 18 September, when 2,000 Austro-Germans surrendered. Most of the fighting, however, was done by the Czechs and Slovaks. A deep and powerful motive lay behind their heroic exploits. Uninterested in Russian internal affairs, they were goaded into opposing the Bolsheviki when the latter openly proclaimed themselves their enemies. They had no desire to upset one Russian régime for another. Their sole aim was the defeat of the Central Powers and the creation of a free and independent Czecho-Slovak state — to liberate their own country. Wherever they appeared the Bolsheviki fled before them and the populations greeted them as friends and liberators, joining them and re-establishing order. The Allied contribution in men was small and the area of their operations was limited.

During August 1917 Siberia had received the most distinguished prisoners recorded in its annals when the deposed tsar, Nicholas II, and his family arrived at Tobolsk, nearly 2,000 miles east of Petrograd. About April 1918 they were removed to the Crimea, and subsequently to Ekaterinburg, the capital of the Red Ural, on the eastern slope of the Ural Mountains. That town, which is strongly fortified, is the key to Siberia, through which the great railway enters Siberia, and here the Omsk government had decided to establish the base for their operations against the Bolsheviki. The Ural Regional (Bolshevik) Council in Ekaterinburg was seriously threatened early in July 1918 by the approach of Czecho-Slovak forces. At the same time an alleged conspiracy to rescue the tsar was reported to have been discovered. "In view of this fact," a Russian official wireless announced, "the Presidium of the Ural Regional Council decided to shoot the ex-Tsar, Nicholas Romanoff. This decision was carried out on July 16." The Czechs occupied Ekaterinburg a few weeks later.

A Russian army was being raised by the Omsk government in the autumn of 1918 under General Gaida (a Czech) and organized by General Diederichs (a Russian). This force, the "White Guards," elected its own officers and was permeated with indiscipline. Furthermore, there was a general lack of confidence in the purpose of the Allies to defend Siberia. Confusion soon arose over the question of authority. German and Bolshevist agents were busy in all Siberian towns. No measures to secure public safety were undertaken owing to lack of co-operations between Russians and Czechs. American, British, French, Japanese and Italian troops were now penetrating Siberia proper from the east. On the night of 16 Oct. 1918 the first *échelon* of the Allied contingent steamed into the station at Zema, in central Siberia, when the train engineer was immediately held up by armed men and threatened with death if he did not vacate his post and join a strike which had just begun. Colonel John Ward commanded the British force. He instantly took over control of the station, marched a detachment into the town, surrounded the house of the strike leader and arrested him, A proclamation was put up declaring that any workman absent from his post next day would be court-martialed. The troops occupied all the workshops and public buildings during the night, and next morning the strike was over. Armed Bolsheviki surrendered their weapons under penalty of death. This resolute action frustrated a deliberate plan to stop the westward transport of Allied troops. A continuous stream of refugees from Russia poured into Siberia in search of food, drifting into crowded towns in a deplorable state of destitution. Sporadic fighting continued to the end of the year. In January 1919 an agreement was arrived at in Tokio for joint Allied control of the Siberian and Chinese Eastern railways, to restore the efficiency of those lines by a committee of American, British, French, Japanese, Italian and Chinese representatives under the presidency of a Russian. About the same time the question of command was settled. Admiral Kolchak was to remain dictator and nominal commander-in-chief and the French General

Janin was given supreme control of the operations against the Bolsheviki. The British General Knox was placed in command of the rear. Labor troubles, mainly due to delayed payment of wages, led to numerous strikes throughout Siberia, hampering both administrative and military activity. Colonel Ward was sent on a mission of investigation from town to town and to address the workmen, Kolchak promising to support any ameliorative measures proposed.

After the armistice with Germany (11 Nov. 1918) public interest in Siberia waned; opposition grew in America and Great Britain against maintaining troops in Russia. Public opinion in Canada agitated for the return of Canadian troops, of whom about 5,000 were stationed at Vladivostok, but had not been in action against the Bolsheviki. In February these were ordered to be sent home in the spring. Many Czechs, Slovaks and Poles were recalled by their new governments.

During January the Russo-Czech forces lost the city of Ufa and Orenburg to the Bolsheviki, but made some gains at Tobolsk, Sarapol and Kungur. The Siberian army began an offensive against the Ural front early in March 1919 and captured the towns of Okhansk and Ossa, both southwest of Perm, and Birsk, north of Ufa. The condition of Siberia at this time was one of chaos, misery, starvation, intrigue and bloodshed, "with the smoldering red terror of Bolshevism awaiting to overwhelm all." While the greatest shortage prevailed in the cities and plains, the wharves of Vladivostok were piled up with supplies from America—cotton, machinery, guns and railroad material. Most of this had been landed before the Revolution, and Allied vessels were still pouring in supplies, the distribution of which was hindered by frequent breakdowns on the railway owing to the destruction of tunnels. During April–May 1919 the Allies made good progress. Kolchak's forces gained several important points on a front of 100 miles and had established contact with the Allied Archangel line. At Tomsk, 50 miles south of Ufa, a whole regiment of Bolshevik cavalry went over and immediately turned their weapons against their former comrades. A few days later a Bolshevik army of 40,000 to 50,000 men seized the valuable Lena Goldfields in the province of Irkutsk, a region lying within the sphere of the Kolchak government. The numerous roving bands of Bolsheviki in the vast spaces of Siberia had never been subdued, and at places remote from the railway were still able to defy the government. For over six months Kolchak had striven in vain to secure the recognition of his government by the Allied Powers. The congress of the Constitutional Democratic party had urged all Russian citizens to unite around Kolchak in the name of the independence of Russia. The Jewish community in the city of Tomsk placed 1,000,000 rubles at his disposal for the army. His government was the only one in Russia approved and recognized by all political parties outside the Bolshevik ring.

The summer of 1919 found the Kolchak government still unrecognized by the hesitant Allies. Meanwhile his campaign against the Red Army had taken an unfavorable turn. The crisis came in the months of May–June, when Kolchak's force, weakened by dissensions within and political differences without, was driven back in increasing disorder first to the Urals and then to Irkutsk. There, betrayed and surrendered to his Bolshevist enemies, he was executed on 7 Feb. 1920. Greater chaos followed this turn of affairs in Siberia, which were aggravated by the military occupation of the country by the victorious Bolshevists. Having already taken the towns of Omsk and Tomsk in 1919, the Red Army, then master of the Trans-Siberian Railway, occupied the whole of Kamchatka by the middle of January 1920. Soon the Russian Soviet established its authority over the entire area west of Lake Baikal. Ruthless measures gradually restored outward order and by 1921, when the long series of civil and foreign wars that followed in the wake of the Bolshevist revolution was over, practically all of Siberia had been subjugated by the Bolsheviki. After that, the history of Siberia became merged in that of Soviet Russia.

After the collapse of the All-Russian Siberian Government and the Allied efforts at intervention, the Bolshevists in Siberia proceeded to erect a "buffer state" between their newly-acquired Asiatic territory and Japan. They shrewdly transformed the Irkutsk West-Siberian Revolutionary Committee into a Far Eastern Republic, ostensibly independent but in reality controlled by the Soviet State. In 1920 this republic transferred the vast region of Kamchatka to the Soviet; in 1922 it became Soviet in earnest, under the title of "the Far Eastern Soviet Socialist Republic"; and in 1925 it ceased to exist altogether, absorbed in the Soviet Republic. The general principle underlying all territorial divisions and sub-divisions in Siberia, as indeed within the rest of Asiatic Russia, was apparently that of allowing the various "autonomous" groups as much nominal political independence as would satisfy their

Asiatic Members of the Union of Socialist Soviet Republics.

Name	Capital	Area square kilom.	Population
Transcaucasian S.S.R.	Tiflis	184,492	7,110,800
Turkomanistan S.S.R.	Askhabad	491,216	1,268,900
Uzbekian S.S.R.	Tashkent	195,246	5,417,800
Tajikian S.S.R.	Stalinabad	145,400	1,332,700
Kirghizia A.R.	Frunze	101,200	1,302,100
Kazak A.S.S.R.	Alma Ata	1,400,000	6,796,600
Yakutsk Republic	Yakutsk	3,769,000	327,500
Buriat-Mongol Republic	Ulan-Ude	419,000	620,900
Baskhir Republic	Ufa	100,800	2,889,800
Mordov	Saransk	21,000	1,414,600
Kabardian-Balkar	Naichik	12,000	278,800
Tatar	Kazan	61,000	2,784,800

respective desires for local self-government without placing any real political power into their hands. Thus every territorial unit within the Union, with but a single exception, fell under the economic and political control of the Russian Soviet, no matter how "autonomous" it was supposed to be.

Besides the political and territorial divisions already mentioned, Siberia—in the more general sense of Asiatic Russia—contains several of the various members of the Union of Soviet Socialist Republics. Of these the leading members are shown in the preceding table.

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DAVID MODELL,
Specialist in Russian Subjects.

SIBERIAN RAILWAY. See TRANS-SIBERIAN RAILWAY.

SIBERT, William Luther, American soldier and engineer: b. Gadsden, Ala., Oct. 12, 1860; d. near Bowling Green, Ky., Oct. 16, 1935. He graduated from the University of Alabama in 1880 and from the U. S. Military Academy in 1884. Assigned to the Engineers, he directed, in the years immediately following, several important government projects, including a ship canal between the Great Lakes. He was appointed a member of the Isthmian Canal Commission in 1907, and until 1914 was engaged on the Panama Canal, where he built the Gatun Locks and Dam, and excavated the channel from Gatun to the Atlantic Ocean. He received the thanks of Congress for his services.

Promoted major general in 1917, Sibert accompanied Gen. Pershing to France and took command of the First Division. In Jan. 1918 he returned home to command the South-Eastern Department at Charleston. He organized and directed the Chemical Warfare Service, 1918–1920, and retired in the latter year. From 1923 he was chairman and chief engineer of the Alabama State Docks Commission. He received the D. S. M. and the Legion of Honor.

SIBLEY, sĭb'lĭ, **Henry Hastings,** American soldier: b. Detroit, Mich., Feb. 20, 1811; d. Saint Paul, Minn., Feb. 18, 1891. He was chosen delegate to Congress from Wisconsin and Minnesota Territories in 1849, representing both in a similar capacity until 1853. He was elected the first governor of Minnesota 1858, and through his personal efforts he successfully brought the Sioux War to a close in 1863. The later years of his life were occupied with the general educational interests of his State.

SIBLEY, Hiram, American financier: b. North Adams, Mass., Feb. 6, 1807; d. Rochester, N. Y., July 12, 1888. In his early life he worked as shoemaker, and later as journeyman machinist in a cotton factory. In 1843 he established a banking business at Rochester and later was elected sheriff of Monroe County. He was interested in the early experiments in electric telegraph and aided in securing an appropriation from Congress to further the inventions of Samuel F. B. Morse. He combined with other capitalists, among whom was Ezra Cornell, and consolidated the small existing telegraph companies into the Western Union, which was chartered by the legislatures of New York and Wisconsin in 1856. He was elected president of the company and held the office for 10 years.

In 1861, Sibley began the construction of a transcontinental railway that was afterward incorporated with the Eastern systems, making a continuous line from the Atlantic to the Pacific. He projected a telegraphic line with Europe by way of Bering Strait and Siberia and to this end obtained valuable franchises from Russia, but the project was abandoned when the success of the submarine telegraph was assured.

After retiring from the telegraph business he engaged in railroading, mining operations and various other industries. He owned large tracts of improved land and was interested in a seed and nursery business at Rochester. He founded the Sibley College of Mechanical Arts at Cornell University and presented Sibley Hall to the University of Rochester.

SIBLEY, city, Iowa, seat of Osceola County, 75 miles north-northeast of Sioux City, on the Chicago, Rock Island, and Pacific, and the Chicago, St. Paul, Minneapolis, and Omaha railroads. It is an agricultural community with a large cooperative creamery and brick kilns. Pop. (1950) 2,559.

SIBONEY, sē-bō-nā', a village in Cuba, ten miles southeast of Santiago de Cuba near which the United States troops disembarked in the Spanish-American War. It was the scene of a sharp struggle between the American and Spanish forces June 23, 1898. Four troops of Rough Riders, under Colonels Leonard Wood and Theodore Roosevelt, were ambushed at this point and 16 Americans were killed. Notwithstanding their surprise and losses the Americans charged up the hill with such intrepidity that the Spaniards abandoned their block-house and fortified position, leaving 40 of their dead behind. The village was found to be infested with yellow fever, and in July was burned to the ground at the request of the medical officers.

SIBONGA, sē-bōng'ä, Philippines, municipality, province of Cebu, on the east coast, 28 miles southwest of Cebu, the provincial capital. It is on the coast highway, has a good anchorage, and is open to coastwise trade. Pop. (1948) 19,230.

SIBUTU, sē-vōō'tōō, an island of the Tawi Tawi group, Sulu Archipelago, Philippines, 30 miles southwest of the island of Tawi Tawi. It is 18 miles long, two miles wide and covers an area of 36 square miles. The surface is mostly flat, with a conical hill in the center rising to the height of 500 feet. It is heavily wooded, and the soil is fertile, but there is no agriculture. There is a transient population of Moro and Sulu fishermen and a small village on the southeast coast.

This island was found to be nine miles outside the western line of demarcation under the Paris treaty with Spain, and in 1900 was

by a supplementary convention (concluded Nov. 7; proclaimed May 23, 1901) included along with Cagayan Sulu Island in the Spanish possessions ceded to the United States. Spain received a grant of $100,000 for correction of the oversight. Pop. (1948) 3,947.

SIBUYAN, sē-vo͞o-yän′, island, Republic of the Philippines, in Romblon Province, in the Sibuyan Sea, between Luzon and Panay islands on the north and south, and Masbate and Tablas islands on the east and west; area 173 square miles. Its highest point is Mount Guitinguitin, 6,750 feet. Its chief products are rice and coconuts. Cajidiocan, on the eastern coast, is the chief municipality. Pop. (1948) 21,971.

SIBYL, sĭb′ĭl, in ancient mythology, a prophetess. Among the early Greeks and Romans such a prophetess was supposed to be inspired by a god, usually Apollo. She was often associated with some shrine or temple, as at Delphi, where the sibyl while in trance uttered her prophetic sayings in unintelligible riddles which were translated by attendant priests, who might also write out the prophecies in Greek hexameter verse. By the 4th century B.C., several such sibyls lived in various parts of the ancient world, the most widely known among them being the Babylonian (or Persian), Cimmerian, Cumaean, Delphian, Erythraean, Libyan, Phrygian, Samian, Tiburtine, and Trojan (or Hellespontine) sibyls. Of these, the most famous was the Cumaean Sibyl, who, according to legend, conducted Aeneas on his visit to the lower world, and sold Tarquin the Proud the Sibylline Books. She lived in a cave in the heart of Mount Cuma near Cumae, a Greek colony in southern Italy. The caves and the underground cavern where the sibyl pronounced her prophecies still exist. Speaking tubes cut through the rock and skillfully arranged sounding boards made it seem that the prophetic voice came from the center of the earth and spoke from every side, just as Virgil describes it in the *Aeneid*. See also SIBYLLINE BOOKS.

"Persian Sibyl" by Michelangelo.

SIBYLLINE BOOKS, sĭb′ĭ-līn, the three books (or rolls) of prophecies concerning Rome which the Sibyl of Cumae sold to Lucius Tarquinius Superbus (534–510 B.C.), called Tarquin the Proud, last of the legendary kings of early Rome. The legend is that the sibyl first offered nine books to Tarquin at a price so high that he refused to buy them. She then burned three of the books and offered the remaining six at the same price. Again Tarquin refused, whereupon the sibyl burned three more. Tarquin, fearing that she might destroy them all, bought the last three books at the price the sibyl had asked for the nine. The books were placed in the care of the Quindecimviri Sacris Faciundis, a commission of 15 members, who at the direction of the Senate, in times of public danger, consulted the prophecies to learn what religious measures should be taken to ward off the threatened calamities. For many years the books were kept in a stone chest in the temple of Jupiter Capitolinus, but were lost in the fire which destroyed the temple in 83 B.C. A new collection of sibylline verses was made and placed in the temple of the Palatine Apollo, and was apparently in existence until the year 400.

SIBYLLINE ORACLES. Between the 1st century B.C. and the 2d century A.D., a collection of spurious sibylline verses grew up, some fragments of ancient oracles, others largely the work of learned Jews of Alexandria. To some of these were added Christian interpolations making the supposed sayings of the sibyl contain prophecies concerning the Messiah. An illustration of the way these oracles linked the sibyl and Biblical personages is in the first stanza of the *Dies Irae: teste David cum Sibylla* (witness David with the Sibyl), which makes both David and the sibyl prophesy destruction of the earth by fire. There were about 15 books of these oracles; some 14 of them are still extant.

SICARD, sē-kär′, **Roche Ambroise Cucurron** (known as ABBÉ SICARD), French educator of deaf-mutes: b. Fousseret, near Toulouse, France, Sept. 20, 1742; d. Paris, May 10, 1822. After studying the methods of the Abbé l'Épée at the Paris Institution for Deaf-Mutes, Sicard became director of a similar school in Bordeaux. In 1789 he succeeded the Abbé l'Epée as director of the Paris school and made important improvements in the teaching methods. During the French Revolution he narrowly escaped with his life, and under the Directory avoided exile only by hiding. On the overthrow of the Directory, he resumed his work with the deaf and dumb, and in 1816 was made a member of the Académie Française. Besides other works, he wrote *Théorie des signes pour l'instruction des sourds-muets* (1808).

SICILIAN CAMPAIGN. See WORLD WAR II—*An Attack Upon Fortress Europe* (The Sicilian Campaign).

SICILIAN VESPERS, sĭ-sĭl′yăn vĕs′pĕrz, the revolt against French rule in Sicily which broke out at Palermo on Easter Monday, March 30, 1282, and quickly spread throughout the island. In revenge for the barbarous misrule of the French officials whom Charles I had left to govern Sicily when he moved his court from Palermo to Naples,

the populace massacred most of the French in Sicily. The ringing of the vesper bell was said to be the signal for the uprising to begin, hence the name. See also SICILIES, KINGDOM OF THE TWO.

SICILIES, Kingdom of the Two, a former political and sovereign state of Italy consisting of the southern portion of the Italian peninsula and the island of Sicily. After the fall of the Roman Empire in 476 A.D., southern Italy and Sicily were occupied by the Ostrogoths. By the middle of the 6th century (535), however, both Naples and Sicily came under the rule of the Greek emperors who administered the two regions through a governor appointed by the exarch of Ravenna. In the 9th century a violent rivalry arose between the exarchs and the Lombards which eventually resulted in the establishment of several independent duchies, among them Salerno, Capua, Taranto, and Benevento, the most powerful of them. At the same time, Naples, Amalfi, and Gaeta were governed as republics.

In 827 the Saracens took Sicily from the Greeks, holding it until 878. Meanwhile, they also invaded Calabria, Bari, and Taranto. The struggle between the Saracens and the Greeks for the possession of southern Italy continued until 967 when Emperor Otto I succeeded in placing Benevento under the German Empire. Around the year 1000 Palermo became the center of the new Arabic civilization. For the next 200 years Germans, Greeks, and Arabs were in constant warfare for the possession of southern Italy and Sicily. This rivalry encouraged the Normans to descend into Italy. Their occupation of Aversa, in the Province of Caserta, toward the middle of the 11th century, soon brought more Normans to Italy. In 1047 five of the sons of Tancrède de Hauteville, a count in Lower Normandy, descended into Italy with many followers. The boldest and most artful of the five was Robert Guiscard who trained the local peasants to become his best soldiers. Their support made it possible for Count Robert to hold Apulia which, in 1053, he had received as a papal fief. Seven years later he assumed the title of duke of Apulia and Calabria. Not long afterward, in 1072, his younger brother, Count Roger, conquered Sicily. The death in 1085 of Count Robert, who left no heirs, permitted Count Roger to combine in his person the whole power of the House of Hauteville as Roger I of Sicily. Meanwhile, his second son and successor, Roger II, succeeded in taking possession of all Lower Italy by subduing Capua, Amalfi, and Naples which, up to that time, had been prosperous commercial republics. Finally, in 1130, the antipope, Anacletus II, bestowed upon Roger II the title of king of Apulia, Calabria, and Sicily. This union of Naples and Sicily, which now became known as the Kingdom of the Two Sicilies, continued for 150 years. Each section, however, was permitted to retain its existing laws.

In 1198 Frederick (the son of Henry VI), under the guardianship of Pope Innocent III, was made king of Sicily as Frederick II. An enlightened ruler, Frederick established his capital in Palermo, where he introduced wise legislation, fostered the modern spirit, and developed literary and cultural activities. He attracted many learned men and poets who formed the Sicilian School of Poetry. For the first time the native language was used extensively in poetical compositions. Frederick also established the University of Naples and the School of Medicine of Salerno. In 1220 Pope Honorius III made him Holy Roman Emperor, as Frederick II.

The death of Frederick II in 1250 struck a serious blow to the empire, the Ghibelline party, and the cultural development of southern Italy and Sicily. Pope Clement IV, who had formed an alliance with the communes, conferred the investiture of the crown of Sicily on Charles I of Anjou (1226–1285), the brother of Louis IX, king of France. In the war which ensued, Manfred, son of Frederick II, was killed at the Battle of Benevento in 1266. Thereupon Charles I took possession of the kingdom. The power wielded by Charles I was great, but the Sicilians were not satisfied with the French feudal lords, especially after they transferred their capital from Palermo to Naples. The revolution of the Sicilian Vespers (1282 q.v.) ended the rule of the Anjous in Sicily. In the struggle, the Sicilians were aided by Peter III, king of Aragon (Spain), who had married a daughter of Manfred. By the Peace of Caltabellotta (1302), the unity of southern Italy was broken, for the Anjous retained possession of southern Italy, while the Aragons occupied Sicily.

For more than a century Naples and Sicily remained divided. They were united again in 1442, under Alfonso V of Aragon (r. 1416–1458), who ruled Sicily and Sardinia as Alfonso I. On his death, in 1458, his natural son, Ferdinand I, succeeded him only in the kingdom of Naples (r. 1458–1494). In 1494, Charles VIII, son and successor of Louis XI, invaded Italy, reached Naples (1495) without opposition, and occupied the kingdom of Naples as heir to the rights of the house of Anjou. The king of Aragon, Ferdinand II, after a show of resistance, withdrew to Ischia. A struggle between the French and a league consisting of the pope, the emperor, Ferdinand of Aragon, Venice, and Milan, ended in 1503 with the victory of the Spaniards in Naples. In 1504 Sicily was again united to Naples under the Spanish crown, and governed by viceroys.

The Peace of Utrecht in 1713 again divided the Two Sicilies, Naples falling to Charles VI of Austria, and Sicily to Victor Amadeus II of Savoy. King Philip V of Spain reconquered Sicily in 1718, at the instigation of Cardinal Giulio Alberoni, but he was forced to cede it to Austria in 1720, Savoy receiving Sardinia in exchange. In this manner the Two Sicilies became a part of the Austrian dominions.

In 1734 the Spanish infante, Don Carlos, son of Philip V, at the head of an army invaded Naples, conquered both the continental and the insular parts of the kingdom, and became king as Charles IV (later Charles III of Spain, q.v.). When the wars of the Austrian succession ended in 1748, with the Peace of Aachen, Italy was able to enjoy a half century of peace, during which the Bourbons in Naples governed the region with wisdom and tolerance.

In 1759, when Charles IV ascended the Spanish throne as Charles III, he conferred the kingdom of the Two Sicilies on his son Ferdinand IV of Naples, and decreed at the same time that it should never again be united to the Spanish monarchy. The reign of Ferdinand IV extended through the stormy period of the French Revolution and the subsequent European commotions. On March 30, 1806, Napoleon appointed his brother Joseph king of Naples. On July 15, 1808, Joseph was replaced by Joachim Murat who assumed the title of Joachim I, king of Naples, while Ferdinand IV was relegated to Sicily. The Congress of Vienna which convened in 1815 restored the Bourbons to the Two Sicilies. Ferdinand IV now assumed the title of

Ferdinand I and reigned until 1825. (His successors, Francis I, r. 1825–1830; Ferdinand II, called Bomba, r. 1830–1859; and Francis II, r. 1859–1861, were despotic tyrants who forced the people into periodic revolts which were put down with much severity.) In 1821 Ferdinand I was forced by Austria to crush the rebels and annul the constitution which he had granted the previous year. Another revolution in 1848 seriously threatened the Bourbon dynasty but it was quickly suppressed.

In May 1860, however, an insurrection broke out in Sicily, and an expedition of 1,000 volunteers from Piedmont and other provinces, under the leadership of Giuseppe Garibaldi, sailed from Genoa to the assistance of the insurgents. This small army, swelling in numbers as it progressed, advanced through the entire island, gaining victories at Calatafimi and Milazzo and driving the Neapolitan troops from the island. Following up his success, Garibaldi crossed to the mainland, where he met little or no opposition. Francis II fled from Naples and the strong places in his hands were reduced. By a popular vote, the Kingdom of the Two Sicilies ceased to exist as such and became an integral part of the kingdom of Italy, which was proclaimed by the Italian Parliament on March 17, 1861. For bibliography, see SICILY. See also NAPLES, KINGDOM OF.

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SICILY, sĭs'ĭ-lĭ (Ital. SICILIA), largest and most populous island in the Mediterranean Sea, forming with some small neighboring islands, chiefly Pantelleria, Ustica, and Lipari and Egadi islands, an autonomous region of Italy. The island lies off the southwestern tip of the Italian peninsula, from which it is separated by the Strait of Messina which at its narrowest point is about two miles wide. The island's roughly triangular shape gave it in ancient times the name Trinacria or Triquetra, the vertices of which are the three principal capes: northeast, Cape Faro (Peloro); southeast, Cape Passero (Pachino); northwest, Cape Boeo (Lilibeo).

Geography.—Sicily lies almost in the center of the Mediterranean, approximately 80 miles from Cape Bon, in northeast Tunisia. Except for the plain of Catania in the east and the Conca d'Oro near Palermo, the coast is steep and cliffs and hills abound. The surface is generally mountainous, for the most part rising more than 500 feet above sea level. The principal mountain ranges, which in their geological formation are the continuation of the Calabrian Apennines, are the Peloritani (Mount Grande, 4,562 feet); the Nebrodi (Mount Moro, 4,758 feet), Mount Sori (6,129 feet); Le Madonie (the Pizzo Antenna, 6,557 feet), and Rocca Busambra (5,362 feet). In the western central part there is a high plateau which culminates in Mount Cammarata (5,239 feet). A depression through which flow the rivers Torto and Platani separates west Sicily from the east, on a line which extends from Termini Imerese, on the Tyrrhenian Sea, to Porto Empedocle, on the Sicilian channel. To the east of this depression is the sulphur plateau, with the Erei and Iblei mountains. On the east coast is Mount Etna, 10,884 feet, the largest volcano in Italy. The tracts of plains include the beautiful plateaus of Conca d'Oro, near Palermo, dominated by Mount Pellegrino (2,012 feet), and the Plain of Catania, famous for their fertility and mild climate.

There are many rivers, but except during the rainy seasons of autumn and winter, most of them are dry. The largest river is the Salso (89 miles). This river and the Platani (68 miles) and the Belice (47 miles) empty into the African Sea. The Simeto (72 miles) empties into the Gulf of Catania after receiving the waters from the Dittaino and the Gorna lunga. The important gulfs are Palermo, Castellammare, Patti, Catania, Augusta, Noto, and Gela. The principal ports are Palermo, Messina, Catania, Syracuse (Siracusa), Marsala, and Trapani.

Sicily is surrounded by islands which come within its jurisdiction. The Lipari Islands, northwest of Messina, besides the active volcano Stromboli, include the small islands of Lipari, Salina, Filicudi, Alicudi, Vulcano, and Panaria. The Pelagie (Pelagian Islands) comprise the islands of Lampedusa, Lampione, and Linosa. Ustica Island is north of Palermo. The Egadi group is west of Trapani. Pantelleria is in the Mediterranean, about 65 miles southwest of the Sicilian coast.

Climate.—The climate of Sicily is mild even during the winter months. Frost and snow are rare on low grounds and along the coast. The top of Etna, however, is covered with snow even in July. The excessive heat of the summer is tempered by gentle, cool breezes. The mean temperature in Palermo is 13°C. in winter; 16.4°C. in spring; 21.1°C. in summer; and 20.3°C. in autumn. The summer months are fairly dry and rainfall is scarce.

Area and Population.—With an area of 9,815 square miles (exclusive of the neighboring small islands), Sicily ranks first among the Italian regions. On Jan. 1, 1954, the estimated population was 4,571,147, equivalent to 466 inhabitants per square mile. In the 1951 census it had a population of 4,462,220 inhabitants, an increase of 894,100 persons, or 20 per cent, since the 1901 census. The increase occurred despite the fact that more than 160,000 Sicilians are residing in other regions of Italy, and several hundred thousand others have migrated to European and oversea countries. In 1906, 127,000 Sicilians (3.5 per cent of the population) emigrated. Since the end of World War I, however, emigration has fallen off considerably.

The population of Sicily is growing at a faster rate than that of the rest of the country. Per thousand population, in 1953, the birth rate was 21.7; the death rate 9.5; and the excess of births over deaths was 12.2. During the same year Italy, as a whole, had a birth rate of 17.4; a death rate of 9.8; and an excess of births over deaths of 7.6.

The 1954 population of the nine provinces into which the island is divided are represented in the following table:

Province	No. of Communes	Population 1954 (Residente)
Agrigento	42	471,903
Caltanissetta	22	298,496
Catania	53	800,051
Enna	20	242,675
Messina	103	667,963
Palermo	77	1,021,701
Ragusa	12	239,337
Siracusa	19	323,012
Trapani	23	421,611
Total, Sicily	370	4,486,749

Above left: Young girl of Piana dei Greci, largest Albanian colony in Sicily. She is wearing picturesque Greco-Albanian costume.

Above: Taormina, built along the sea on a natural terrace, regarded as the most scenic city in Sicily. It affords a fine view of Mount Etna.

SICILY

Right: An interesting street in the Old City section of Palermo.

Below: The village of Vizzini: two villagers converse in front of the home of Giovanni Verga (d. 1922) on whose short story the libretto of Cavalleria Rusticana is based.

(Top left and right) Francis C. Fuerst and Interfoto from Black Star; (below) Wide World Photo; (right) Sem Presser—ABC Press from Black Star

Left: Montelepre, village in a district through which ranged a celebrated Sicilian Robin Hood, the robber-bandit Salvatore Giuliano (killed 1950).

Above: Farmer's cart decorated with vividly painted scenes from the Bible.

Above: Palermo Cathedral commenced by King William II of Sicily in 1170. The dome is a late 18th century addition.

Left: Riders in the Giro d'Italia bicycle race parade through the center of Palermo.

Below: Freshly made macaroni is drying in the sun. A sign "Sold Out" indicates that the store owner has gone away for a short while.

(Top left) Sem Presser—ABC Press from Black Star; (top right) Camera Press—Pix Incorporated; (above) Deane Dickason from Ewing Galloway; (left) Associated Press; (below) Foto H. Körte from Black Star

There are only a few large cities. Only three—Palermo, Catania, and Messina—have a population of 100,000 or more. Four others range from 50,000 to 100,000 population.

Palermo (501,005 inhabitants), the capital of the island, is the largest city. Combining modern and ancient characteristics, it has monuments belonging to three distinct periods (Arab-Norman, Renaissance, and Baroque) of which the most noteworthy are the cathedral and the Church of the Martorana, both of which date back to 1132; the royal palace with the Palatine Chapel; San Giovanni degli Eremiti and the Palazzo La Zisa. Beautiful villas and fountains enrich the city, which is also important for its position and commerce. Near Palermo is Monreale with its imposing Norman cathedral.

Catania (300,298 inhabitants), at the foot of Mount Etna, was destroyed by an eruption of 1669 and an earthquake of 1693. Rebuilt during the 18th century, the city is enriched with fine architecture of that period and with monuments which have escaped destruction, for example, the Duomo, Castello Urbino, and the Elephant Fountain.

Messina (220,790 inhabitants), founded by the Greeks and built on the strait of the same name, was destroyed together with Reggio Calabria by the earthquake of 1908. It has since been rebuilt along modern lines, although it has lost its commercial importance. South of Messina is Taormina, whose natural beauty, climate, and Graeco-Roman ruins make it a mecca for tourists.

Agrigento (40,557 inhabitants) is famous for its Doric monuments of the Valle dei Templi which are equaled only in Greece. Trapani (71,798 inhabitants), ancient Phoenician colony, has a good port for the local industries, salt-making, tuna fisheries, and wine making. Syracuse (71,212 inhabitants) is well known for its port and Greek theater and amphitheater, a museum which houses the Anadyomene Venus, and its ancient latomie (stone quarries used as prisons). Ragusa (48,391 inhabitants) lies inland in the southeastern part of the island and is noted for its asphalt mines and oil, and for a magnificent baroque church (Basilica of St. George). Caltanissetta (60,303 inhabitants) and Enna (27,154 inhabitants) are located in the eastern part of the island.

The Sicilians are a hard working, passionate people who have given many famous poets, musicians, painters and writers to the world, including Stesichorus, Theocritus, Empedocles, Archimedes, Alessandro Scarlatti, Giovanni Meli, Giovanni Pacini, Vincenzo Bellini, Michele Amari, Filippo Juvara, Francesco Crispi, Giovanni Battista Basile, Giovanni Verga, Mario Rapisardi, Luigi Pirandello, and Giovanni Gentile.

Organized brigandage and the Mafia have disappeared.

Government.—The Constitutional Law No. 2 of Feb. 26, 1948, provided for the regional autonomy of the island with its own juridical system within the political unity of the state. The Regional Assembly, consisting of 90 members, is elected every four years by universal, secret, and direct suffrage. The executive and administrative branches of the government are vested in the president, who is elected by majority vote of the Regional Assembly, and in a board of assessors. The Regional Assembly is concerned with problems related to agriculture, drainage, industry, commerce, public works, mining, fisheries, public welfare, education, museums, libraries, academies, public health and hygiene, communications, credit and banking, social and labor legislation.

Education.—In 1860 almost 90 per cent of the population was illiterate; by 1931, 40 per cent of the population six years of age or over could not read or write. Educational facilities greatly improved, however, after the end of World War II. In 1952–1953 there were 419,500 pupils in elementary schools; there were 16,798 teachers; and 2,850 schools. Registration in the junior and senior high schools has increased greatly. There are three universities—Palermo, Catania, and Messina—with a total enrollment (1952–1953) of 18,076.

Agriculture.—Sicily is essentially an agricultural region, though cattle raising is not prosperous. Wide pockets of fertile valley land are found along the coasts, notably around Palermo and Catania, which are cultivated as vineyards, or as olive, orange, and lemon groves. Despite the constant danger of droughts, Sicily produces 10 per cent of Italy's wheat, one third of her rye, one eighth of her olive oil, and one twelfth of her wine. In Roman days, the richness of her soil made the island the granary of Italy. Other important products are the locust or carob bean (used for forage), corn, mulberry leaf, chestnuts, almonds, pistachio nuts, hazelnuts, and prickly pear. Large quantities of almonds and citrus fruits are exported to European and overseas countries. Vegetables are cultivated especially in the vicinity of large cities.

Industry.—The most important industries are those making food products, such as tomato sauce and paste, and spaghetti. Deep-sea fisheries, tuna and sardine fishing, and citric acid production, are also important, especially in the vicinity of Marsala and Palermo. The mechanical and chemical industries are centered around Palermo. The making of Marsala wine constitutes a flourishing industry.

Sicily is rich in sulphur mines which are located in the provinces of Caltanissetta, Enna, and Agrigento. Before World War I, Sicily was the largest producer of sulphur in the world; it has now to compete with American sulphur. Other important mineral deposits include asphalt, common salt, and rock salt. Oil has been discovered near Ragusa in the southeastern corner of the island. Experimental drilling for oil is also proceeding intensively in Agrigento Province where some 519,000 hectares of land are being drilled (1 hectare = 2.471 acres). In an effort to improve the industrial development of the island, there has recently been created the Istituto per il Finanziamento alle Industrie in Sicily (IRFIS) —Institute for the Financing of Industry in Sicily—which has already appropriated more than 4,028,000,000 lire ($1 = about 624 lire).

Economy.—Trade and production in Sicily have long lagged behind the central and northern regions of Italy. However, although there is still much poverty, economic conditions have steadily improved since the end of World War II, when the regional government initiated its program for the expropriation of large estates for the benefit of the peasant class. In addition, the regional government has undertaken many public works and social improvements either with its own funds, in conjunction with other state

agencies, or with the contribution of the Southern Italy Fund. Up to Dec. 31, 1954, a total of 16 billion lire had been allocated for road construction and repair. A total of 75,237 miles of new roads were built, and 616,365 miles of roads were repaired. The national government has appropriated more than 1,280 billion lire for the Southern Italy Fund, of which 251,140 million lire have been earmarked for Sicily. Exclusive of appropriations made through the Southern Italy Fund and the National Solidarity Fund, the national government to January 1955, had appropriated a total of 3,613 billion lire for agriculture, industry, housing, roads, hygiene, public health, schools, and other improvements.

These public works projects have served to improve the economic conditions of the island. Only 266,000 persons, or 6.1 per cent of the working population, were unemployed in 1953. A total of 4,117,000 were employed. In the whole of Italy, during the same year, 6.6 per cent of the working population was unemployed.

Communications.—Before it became a part of the kingdom of Italy in 1860, Sicily had no railway lines. Now, however, a network of main and secondary lines unite the principal cities and towns. The mountainous character of the island has made the construction of railroads and automobile roads very costly. Communications by water are well developed. Steamers ply daily between Naples and Palermo and between Naples and Messina and Catania. Several navigation companies touch the ports of Sicily. Communication with the mainland is in general by ferryboats which ply between Messina and Villa San Giovanni and Reggio Calabria but construction of a dual suspension bridge across the Strait of Messina is under study.

History.—The history of Sicily goes back to several thousand years before Christ. In 1952 in a cave near Palermo, Stone Age drawings were discovered which are placed roughly at 15,000 B.C. Among them are the oldest drawings of human figures ever found. The legendary Cyclops of Homer's *Odyssey* lived on the island. The first people of historical record here were the Sicans (Sicani) who inhabited the island 11 centuries before Christ. The Sicans were driven out by the Sicels (Siculi) who gave the island its name, occupying most of the land east of the river Gela. However, there is no substantial difference between the Sicans and the Sicels, and it is probable that both are branches of the Libyco-Iberian stock. Sicily was already a part of the Mycenaean civilization of Crete before the arrival of the Phoenicians. Because of its geographical position and the fertility of its soil, the island attracted many navigators, including the Phoenicians who established important trading settlements along the coast or on summits along the coast. But the Greeks about 724 B.C. founded Messina, which they called Zancle (Greek for sickle) from the shape of its harbor. Even earlier, some Corinthian Greeks had built Syracuse farther south on the eastern coast. Moving westward, in 691 B.C., they also settled Gela on the southwestern coast of the island. By 635 B.C. the Greeks had driven the Phoenicians back to Motya, Solus, and Panormus (Palermo) in the western part of the island, and meanwhile had set foot on the southern portion of the peninsula, calling the united lands by the name of Magna Graecia.

Under the Greeks, Sicily became highly civilized and prosperous and attained high intellectual progress. The political constitutions were aristocratic, but civil discords gave Phalaris and other tyrants the opportunity to rise to power. By the 5th century B.C. Syracuse was the most important and the strongest of all Greek cities. The Greek temples and monuments of Syracuse, Catania, Messina, Agrigento, Selinunte (Selinus), and Taormina are, after the Parthenon, the most impressive Greek remains in existence. At its greatest Syracuse had a population of a million.

The wealth and resources of Syracuse could not fail to invite conquest. For years it fought off raids by other Sicilian Greeks, especially by the Athenians and the Carthaginians. As a result of Athenian expansion (415–413 B.C.) in Sicily, the island was brought more fully into Greek affairs. Moving westward on the island, the Greeks tried unsuccessfully to found other colonies, for the Carthaginians had already established themselves there. The Phoenicians in Sicily became dependent on Carthage, whose power was a source of constant threats to the Greeks in Sicily. Beginning with the 6th century B.C., a series of tyrannies overtook the island, but fortunately were not long lived. A period of a half century of prosperity followed, during which art, science, poetry, philosophy, and architecture flourished.

Unable to extend their possessions in Sicily, the Greeks began to settle along the Italian mainland, founding Sybaris, Croton, Tarentum, and other cities. Meanwhile, the original inhabitants—the Sicans and the Sicels, the Calabrians, and the Sallentini—at first struggled against the invaders, but in time were assimilated by them. However, no strong bonds united these peoples and internal disorders occurred frequently. With the fall of Athens, Greek domination of Sicily came to an end.

The Carthaginians, Phoenician in origin, who had previously attempted to conquer Palermo, returning to Sicily, reduced the city to a pile of debris. They occupied a large part of the island including Acragas (Agrigentum), Selinunte (Selinus), and Panormus (Palermo). Greeks and Carthaginians, victorious and conquered in turn, fought obstinately for possession of the island.

Encouraged by the strife between the Greeks and the Carthaginians, the Romans moved southward to the Strait of Messina, clashing with the might of Carthage. In this period, the Roman Republic lived some very critical moments, especially during the Second Punic War, when Hannibal led his army into Italy and defeated the Romans more than once. But he was not successful in inducing the Italian cities to rise against Rome, and was finally defeated at Zama in North Africa, in 202 B.C., by the Roman general, Scipio Africanus. During the Third Punic War, another Roman general, Scipio Aemilianus, in 146 B.C., destroyed Carthage. Under the Romans, Sicily became the granary of the empire. For a continuation of the history of Sicily, see SICILIES, KINGDOM OF THE TWO.

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SICK MAN OF EUROPE, The (or OF THE EAST), a term applied to Turkey in 1854 by Czar Nicholas I of Russia in a conversation with Sir Hamilton Seymour, the British ambassador at St. Petersburg. Intimating that in his opinion Turkey was sick and dying, the czar proposed that Russia and Great Britain should come to a private arrangement as to disposal of the Sick Man's possessions. The British government rejected the proposal and intimated belief in the Sick Man's recovery. The term is no longer applied to Turkey.

SICKERT, sĭk'ĕrt, **Walter Richard,** English painter and etcher: b. Munich, Germany, May 31, 1860; d. Bathampton, England, Jan. 23, 1942. He studied art under Alphonse Legros at the Slade School, London, later became a pupil of James Abbott McNeill Whistler, and in the early 1880s studied in Paris with Edgar Degas. Sickert's studio was the center for the Camden Town group of artists, which later became the London group. An associate of the Royal Academy from 1924, he became a member in 1934, but resigned in 1935. The British Museum, Tate Gallery, Luxembourg, and other important galleries have examples of his work.

SICKINGEN, zĭk'ĭng-ĕn, **Franz von,** German knight and Protestant military leader: b. Ebernburg, near Kreuznach, Germany, March 2, 1481; d. Castle Landstuhl, near Kaiserslautern, May 7, 1523. Though the owner of large estates, he chose a military career and helped in the election of Charles V as emperor, becoming imperial chamberlain and councilor. He favored the Reformation and befriended many of its adherents. In 1522–1523 he headed a league to extend the Reformation throughout Germany and to securalize the land of ecclesiastical princes. He was defeated by a coalition of the archbishop of Trier, the landgrave of Hesse, and the count palatine of the Rhine, whose forces besieged him in his fortress castle of Landstuhl, where he died of wounds received in battle.

SICKLES, sĭk"lz, **Daniel Edgar,** American soldier: b. New York, N. Y., Oct. 20, 1825; d. there, May 3, 1914. He attended the University of the City of New York, but left before graduating to enter the printing trade, then studied law, and in 1846 was admitted to the bar. He was elected to the state legislature as a Democrat in 1847, and in 1853 became corporation counsel for New York. Through his efforts in 1852 Central Park was obtained for the city. In 1855 he was elected to the state Senate, and two years later became a member of Congress, serving until 1861. He was tried for the murder of Philip Barton Key, whom he shot on the street in Washington, D.C., on Feb. 27, 1859, because of Key's liaison with his wife, and was acquitted on the grounds of temporary aberration of mind. This was the first case in which that defense was set up. Key was United States attorney for the District of Columbia and son of the author of *The Star-Spangled Banner.*

At the beginning of the Civil War, Sickles raised in New York the Excelsior Brigade of volunteers, was commissioned colonel, became brigadier general the following September, and participated in the Peninsular campaign. As major general of volunteers, he was given command of the 3d Corps in February 1863, and fought at Chancellorsville and Gettysburg. At Chancellorsville he gained the first success of the day by cutting off the enemy's ammunition train and rallying the retreating Union artillery. At Gettysburg his corps withstood the Confederate assault on the famous peach orchard salient, and Sickles lost a leg in the encounter. He continued in active service until 1865, when he was sent on a confidential government mission to South America. Upon his return that year, he was appointed military governor of the Carolinas, but in 1867 was relieved of his command by President Andrew Johnson because of the severity of his measures. Mustered out of the volunteer army in 1868, he became a colonel in the regular army, and in 1869 was retired with the rank of major general. In 1869–1873 he served as United States minister to Spain. After serving another term in Congress from 1893–1895, he lived in New York City.

SICYON, sĭsh'ĭ-ŏn; sĭs'ĭ-ŏn (mod. Gr. SIKIÓN), ancient city, Greece, in Corinthia Department, about 10 miles northwest of Corinth and two miles from the Gulf of Corinth. The modern village of Vasilikón occupies the site. Founded from Argos and under its domination for several centuries, Sicyon gained its independence about 660 B.C., and for more than a century was ruled by tyrants, reaching its greatest power under Cleisthenes. It was an ally of Sparta in the Peloponnesian War (431–404 B.C.). In 251 B.C., it became a democracy under the leadership of its chief citizen, Aratus, and joined the Achaean League. From the 6th to the 3d century B.C., the city was a center of art and philosophy, and was famous for the beauty of its bronzes. The painters Apelles and Pamphilus and the sculptors Canacnus and Lysippus flourished there. The American School at Athens has excavated several of the ancient structures, including the theater and stadium.

SIDDHARTHA. See BUDDHA AND BUDDHISM; INDIA—*Buddhism.*

SIDDONS, sĭd"nz, **Sarah Kemble,** English tragic actress: b. Brecon, Wales, July 5, 1755; d. London, England, June 8, 1831. The eldest daughter of Roger Kemble, manager of a traveling theatrical company, she began her stage career in early childhood, and at 18 married the actor William Siddons. In 1775 David Garrick engaged her for his company at the Drury Lane Theatre, and from December until the following May she appeared there in various parts, including Portia in *The Merchant of Venice,* but without success. She returned to the provincial theaters, and soon began to display the dramatic power for which she became famous. After a phenomenal 5-year run at Bath, she was again engaged for the Drury Lane, and on Oct. 10, 1782 made her reappearance there as Isabella in Garrick's adaptation of Thomas Southerne's tragedy *The Fatal Marriage,* scoring an immediate success. She

was universally acknowledged to be the first tragic actress of the English stage. She subsequently visited Dublin and Edinburgh receiving equal applause. She appeared as Lady Macbeth for the first time in London on Feb. 2, 1785, and in that character was declared perfect by competent critics.

Christopher North, William Hazlitt, Leigh Hunt, Lord Erskine, and many others agreed in praise of her performances, which were at their best in tragedy, and belonged to the fine old declamatory (sometimes called the Kemble) school. In solemn majesty, pathos and minute finish she surpassed Mlle Rachel.

For 30 years she continued to astonish and enchant the lovers of the drama, and having acquired an ample fortune, and been portrayed by Sir Joshua Reynolds as the *Tragic Muse,* she took her leave of the stage in 1812, before an audience which melted into tears on the occasion. She, however, performed subsequently at benefits and gave privately Shakespearian readings.

She was seen as Rosalind, Ophelia, and Desdemona with great success; and, as Catharine in Henry VIII, discovered a part nearly as well suited to her as that of Lady Macbeth.

Consult Campbell, Thomas, *Life of Mrs. Siddons,* 2 vols. (London 1834); Fitzgerald, P. H., *The Kembles,* 3 vols. (London 1871); Kemble, Frances Ann, *Records of a Girlhood,* 3 vols. (London 1878); Maurois, A., *Portrait d'une actrice* (Paris 1927).

SIDEREAL CLOCK, sī-dēr'ē-ăl klŏk, a clock regulated to measure sidereal time, reckoned by sidereal days of 23 hours, 56 minutes, 4 seconds mean solar time, which are measured by the interval between two successive passages of any fixed star over the same meridian, and divided into 24 sidereal hours.

SIDEREAL TIME, for all practical purposes measured by the apparent diurnal motion of the stars, due to the Earth's axial rotation. A sidereal day is hence the time from the upper meridian passage of a star until its next passage. Rigorously, it is from one such passage to the next of the vernal equinox point, the day by this being shorter by 1/120 of a second than that determined by stars. Except in exact observations no allowance for this need be made and stars are always used in any case. Stars are so very distant that their motions are quite inappreciable in a day and effects upon the Earth's axial rotation due to its orbital motion are insensible. The sidereal day, due to tidal friction, is growing longer slowly, at about $\frac{1}{1,000}$ of a second per century. Its present length is 23 hours 56 minutes 4.091 seconds of mean time. A sidereal year is the exact period of the revolution of the Earth around the Sun or 365.25636042 mean solar days. The tropical year (our calendar year) contains 366.24 sidereal days, or one more than the number of solar days.

CHARLES P. OLIVIER.

SIDERITE, sĭd'ĕr-īt, a mineral composed of carbonate of iron, and when pure crystallizing in the rhombohedral system. It then is also known as spathic iron. Another name is chalybite. The faces of the rhombohedral crystals are commonly curved, and there is a perfect rhombohedral cleavage. Besides this it occurs in botryoidal and in globular form, with a more or less fibrous internal structure. Again it is massive, or coarsely or finely granular.

The hardness is 3.5 to 4; the specific gravity 3.7 to 3.9. It has a vitreous luster, and is often more or less pearly. The color varies from ash-gray, through yellowish-gray, greenish-gray, to brown and brownish-red; sometimes it is white. The streak is white. It is commonly translucent or subtranslucent.

In composition it is: $FeCO_3$. Part of the iron is usually replaced by manganese, and often by magnesium or calcium.

In the United States siderite occurs at Plymouth, Vt.; Sterling, Mass.; Roxbury, Conn.; Antwerp, Jefferson County, N. Y., and at the Rossie Iron Mines, Saint Lawrence County, N. Y., and in North Carolina. Also in Pennsylvania, Ohio and other states, chiefly as clay iron stones in the coal measures.

SIDEWINDER, sīd'wīn-dĕr, a local name in Arizona for the horned rattlesnake (*Crotalus cerastes*), referring to its sidewise method of progression. See also RATTLESNAKE.

SIDI-BEL-ABBES, sē'dĭ-bĕl-ă-bĕs', commune, Algeria, in the Department of Oran, 40 miles south of the town of Oran, on the Mekerra River. It is a modern walled town, and occupies a height rising from a fertile healthy and populous plain. Numerous fountains adorn the town. It is a leading commercial and trading center for the surrounding agricultural area. There is also trade in wine, olives, and livestock. Manufactures include cement, furniture, cheese, and hosiery. Once a walled town, the city now has a very modern appearance. Pop. (1948) 52,881.

SIDIS, sī'dĭs, **Boris,** Russian-American psychologist: b. Kiev, Russia, Oct. 12, 1867; d. Portsmouth, N. H., Oct. 24, 1923. He came to the United States in 1887, was graduated at Harvard University in 1894 and later pursued postgraduate studies there, taking his Ph.D. in 1897, his M.D. in 1908. He was associate in psychology and psychopathology at the Pathological Institute of New York State hospitals in 1896–1901; in 1901–1904 was director of the psychopathological hospital and laboratory of the New York Infirmary for Women and Children; and subsequently practiced medicine at Boston and at Brookline, Mass. He was also medical director of the Sidis Psychotherapeutic Institute at Portsmouth, N. H. His works include: *An Experimental Study of Sleep* (1909); *Philistine and Genius* (1911); *The Psychology of Laughter* (1913); *The Foundations of Normal and Abnormal Psychology* (1914); *Causation and Treatment of Psychopathic Diseases* (1916), etc.

SIDNEY, sĭd'nĭ, **Algernon,** English statesman and republican, son of the 2d earl of Leicester: b. Penshurst, Kent, 1622; d. London, Eng., Dec. 7, 1682. He was educated under the supervision of his father, whom he accompanied on his embassies to Denmark and to France. He served in 1642 as captain of a troop of horse in Ireland, and in the civil war espoused the cause of Parliament. He was promoted colonel of horse in 1645, was returned to the Long Parliament in 1646 as member for Cardiff, and in 1647 was appointed lieutenant general of the horse in Ireland and governor of Dublin, but was soon superseded and in 1648–1650 was governor of Dover. In 1649 he was appointed one of the commissioners for the trial of Charles I,

but while he attended three of the preliminary meetings he was not present at the trial and did not sign the warrant. He is frequently quoted as approving the measure, and later admitted his justification of it, but his plan, though not exactly clear, seems to have been the deposition of the king by an agreement of both houses. He incurred the enmity of Cromwell by his opposition, and during the first three years of the Commonwealth he stood aloof. In 1652, however, he was elected a member of the council of state and attended 82 meetings in the four and a half months before the council was dissolved by Cromwell, being particularly occupied with foreign affairs. He protested against the Protectorate of Cromwell and afterward held aloof from public affairs until the restoration of the Long Parliament by the army in 1659, when he resumed his place and was again appointed to the council of state. In that year he was sent as a commissioner to negotiate a peace between Sweden and Denmark, and while engaged in this mission the Restoration took place. Aware that his part in the civil troubles could but bring him into disfavor with the royal party, he remained in exile until 1677, when he was given leave to return to settle his private affairs. The excitement attending the exclusion struggle drew Sidney again into politics and he made several unsuccessful attempts to enter Parliament, although outside of that body he wielded a considerable influence. He vindicated himself from an accusation of being the head of a great non-conformist plot soon after the discovery of the "popish plot," but his private letters, though written with great caution, show a deep sympathy for the nonconformists and the Scots as well as an invincible hatred for bishops and Roman Catholics. He was engaged in an intrigue with the French Ambassador through whom he endeavored to persuade Louis XIV to aid the establishment of a republic in England and evidently hoped to gain at least the maintenance of the rights of Parliament. He undoubtedly received pecuniary aid to the extent of 1,000 guineas through the French Ambassador, though he evidently used the money for public purposes. He seems to have taken no part in the armed resistance of Shaftesbury in 1682, but in 1683 he formed one of the "council of six" in the "Ryehouse Plot" to organize an insurrection among the Scottish malcontents. He was arrested after its discovery and sent to the Tower, charged with three overt acts of treason, consisting of consultations amounting to a conspiracy to levy war against the king; invitation to certain Scots to co-operate with his plans; and of having written a treasonable libel concerning the lawfulness of deposing kings. The only witness against him on the first charge was the infamous Lord Howard, the second charge was proven unfounded, and regarding the third though his authorship of the incriminating paper was undoubted, yet there was nothing to show that it was intended for publication. The law demanded two witnesses for high treason. The notorious Judge Jeffreys accepted the paper as the second witness required by the law, and on this faulty evidence Sidney was sentenced to death. After a fruitless petition to the king he was executed on Tower Hill. His 'Discourses on Government' exhibit great acuteness, are forcibly written, and contain valuable historical information. They were first printed in 1698, and have been reprinted in 1740, 1751 and 1772. Consult Ewald, A. C., 'Life and Times of Algernon Sidney' (1873); Meadley, G. W., 'Memoirs of Algernon Sidney' (1813); Van Santvoord, G. V., 'Life of Algernon Sidney' (New York 1851); 'Dictionary of National Biography' (London 1888).

SIDNEY, Sir **Philip,** English soldier, statesman and poet: b. Penshurst, Kent, 30 Nov. 1554; d. Arnhem, Netherlands, 17 Oct. 1586. After studying at Oxford and Cambridge he set off on his travels at 18, visited France, Hungary and Italy. Returning through Germany and Flanders, he arrived in England in 1575. He became a favorite with Queen Elizabeth, who in 1576 sent him on an embassy to Germany. He had a quarrel with the Earl of Oxford, but the queen interposed to prevent a duel from taking place. Sidney, displeased at the issue of the affair, then retired to Wilton in Wiltshire, 1580, and amused himself with the composition of his celebrated pastoral romance, 'Arcadia.' He married Frances, daughter of Sir Francis Walsingham, in 1583. That same year he was knighted. About this time he projected with Sir Francis Drake an expedition against the Spaniards in America, and he had gone to Plymouth to embark on the undertaking, when an express mandate from Elizabeth recalled him to court. Her influence also was exerted to prevent him from being elected king of Poland, "refusing," as Camden says, "to further his advancement out of fear that she should lose the jewel of her times." He was subsequently appointed governor of Flushing, and general of the cavalry under his uncle Dudley, Earl of Leicester, who commanded the forces sent to assist the Dutch against the Spaniards. On 22 Sept. 1586, being at the head of a detachment of the English troops, he fell in with a convoy of the enemy marching toward Zutphen. In the rash charge of 500 against 3,000, Sidney received a shot in his thigh, which shattered the bone. An incident that occurred as he was being borne off the field illustrates his character. It is thus recorded by Lord Brooke (Fulke Greville) his biographer: "In which sad progress, passing along by the rest of the army where his uncle the general was, and being thirsty with excess of bleeding, he called for some drink, which was presently brought him; but as he was putting the bottle to his mouth he saw a poor soldier carried along, who had eaten his last at the same feast, ghastly casting up his eyes at the bottle. Which Sir Philip perceiving, took it from his head before he drank, and delivered it to the poor man with these words: "Thy necessity is greater than mine." His body was carried to England, and after lying several days in state was buried in Old Saint Paul's Cathedral. His brief career, which to many may seem not to justify his great reputation, nevertheless made a powerful impression on English patriotism. So universally was he esteemed that a general mourning for him was observed throughout the whole country. For a month no gentleman of quality cared to appear in London without mourning garb. He was panegyrized by his contemporaries, and the universities issued three volumes of elegies on

his death. "He adorned the paths of love, war, patriotism, religion, all that led through the wide fields of his beautiful, practical chivalry, with the roses and lilies of fragrant, flowery verse." Edmund Gosse. His works, besides the *Arcadia,* consist of the *Apologie for Poetrie,* later changed to *Defense of Poesie; Astrophel and Stella;* a collection entitled *Songs and Sonnets, and other poetical pieces.* None of these was published in his lifetime, his great contemporary fame being based on the reports of those to whom his manuscripts were communicated. He is best known for his *Arcadia,* one of the earliest specimens of the heroic romance, written in mingled prose and verse, the latter exhibiting various attempts to naturalize the measures of Roman poetry, and for the *Astrophel and Stella* cycle of 108 sonnets and 11 songs.

Bibliography.—Lee, Sir Sidney, *Sir Philip Sidney* (New York 1904); Symonds, J. A., *Sir Philip Sidney* (London 1886, New York 1906); Greville, Fulk, *Life of the Renowned Sir Philip Sidney* (London 1816, Oxford 1907); Wallace, M. W., *The Life of Sir Philip Sidney* (Cambridge, Eng. 1915); Denkinger, E. M., *Immortal Sidney* (New York 1931); Thaler, A., *Shakespeare and Sir Philip Sidney* (Cambridge, Mass. 1947).

SIDNEY, city, Ohio, and Shelby County seat, alt. 1,002 feet, on the Miami River; on the Baltimore and Ohio, and the Cleveland, Cincinnati, Chicago and St. Louis railroads; by rail, 38m. N. of Dayton. It is a manufacturing city, making many kinds of machinery, aluminum ware, electric refrigerators, paper-folding machines, and cigars. Civic buildings include a municipal building, a public library, and a county law library. City government is administered by mayor and council. Pop. (1940) 9,790; (1950) 11,491.

SIDNEY LUSKA. See HARLAND, HENRY.

SIDNEY SUSSEX COLLEGE, Cambridge, England, was founded in 1596 under the will of Lady Frances Sidney, countess-dowager of Sussex, aunt to Sir Philip Sidney. The charter was granted in 1594 by Queen Elizabeth to Henry, Earl of Kent and Sir John Harrington, the executors. The present society consists of a master, 11 fellows and 36 scholars. There are 10 fellowships, 24 scholarships, and a number of exhibitions. The scholarships and exhibitions connected with the college are: 30 scholarships varying in value from $150 to $250 a year and five exhibitions, besides several prizes. The college was erected on the site of an ancient Franciscan convent. It consists of two courts much defaced by modern alterations. Oliver Cromwell and Thomas Fuller were members of this college. There are eight church livings in the patronage of the college.

SIDON, sī'dŏn, (Heb. *Zidon;* Arabian *Saida*), anciently a city of Phoenicia (q.v.), on the Lebanese coast of the Mediterranean, lies midway between Sur (Tyre) and Beyrouth. It is surrounded by a wall with two gates. Its chief interest is historical. It was a wealthy city, with an excellent harbor and much commercial enterprise, being specially noted for purple dyes. It was watered by the streams of Lebanon, and many allusions to it are found in secular and scriptural writings. Sidon was referred to as "The first-born of Canaan"; Homer alludes to the ingenious Sidonians and their artistic handiwork. The town was famous for its manufactures of glass, linen, purple dye and perfumes. The Sidonians had their own monarch, but it was once subject to Tyre, and later to the Persians. It passed through many vicissitudes, finally passing over to the Moslems (1291). In the 17th and 18th centuries it became the seat of French commerce. It is now called Saida. Interesting sarcophagi have been found here (now in Istanbul). The present town was stormed by the Allies under Napier in 1840. Pop. (1940) 12,000, most of whom are Mohammedans. See LEBANON.

SIDRA, Gulf of (ancient SYRTIS MAJOR), Tripoli, a wide gulf of the Mediterranean Sea between the main portion of Tripoli and the plateau of Barca. Its coastline of over 500 miles is beset with shoals and sand banks, offering no harbor except Bengazi, at the extreme eastern end. See SYRTIS.

SIEBENGEBIRGE, zē'bĕn-gĕ-bēr'gė (Seven Mountains), Germany, a small chain of mountains near the Rhine, in Rhenish Prussia, 20 miles above Cologne. Above the main range rise seven lofty summits, whence the name. These rugged heights are all crowned with ruins of ancient lordly castles of the 12th century. Ölberg is the highest peak (1,522 feet); while the Drachenfels (q.v.) is the more interesting. Cologne Cathedral was built from stones quarried in these Rhenish Mountains. Some of the peaks are ascended by specially built railways. The scenery is romantic and interesting.

SIEBERT, sē'bėrt, **Wilbur Henry,** American educator: b. Columbus, Ohio, Aug. 30, 1866. He was graduated at Ohio State University in 1888, from Harvard in 1889 and received his A.M. at Harvard in 1890. After studying in Germany he was associate professor at Ohio State University in 1898–1902, and professor from 1902 to 1925 when he became a research professor in history. He served four years as secretary of the faculty and several terms as acting dean of the College of Arts, Philosophy and Science. Among his many publications are *The Underground Railroad from Slavery to Freedom* (1898–1899); *The Government of Ohio* (1903); and numerous papers on the American Loyalists of the Revolutionary epoch.

SIEBOLD, zē'bŏlt, **Karl Theodor Ernst von,** German physiologist and zoologist: b. Würzburg, Feb. 16, 1804; d. Munich, April 7, 1885. He was a member of a family of scientists. After studying at Göttingen and Berlin, in 1840 he was appointed professor of physiology at Erlangen, in 1845 at Freiburg and in 1850 at Breslau. In 1853 he was given the chair of physiology and comparative anatomy at Munich, with later appointment as professor of zoology and director of the zoological and zootomical cabinet. He is remembered as the rediscoverer of parthenogenisis in insects and for his studies of the intestines of worms and fish. In 1849 he was one of the founders of the *Zeitschrift für Wissenschaftliche Zoölogie.* Among his monographs are *Observationes de Salamandris et Tritonibus* (1828); *Lehrbuch der vergleichenden Anatomie der Wirbellosen Tiere* (1848); *Wahre Parthenogenesis bei Schmetterlingen und Bienen* (1856); *Beiträge zur Parthenogenesis der Anthropoden* (1871).

SIEBOLD, Philipp Franz van, German physician and traveler: b. Würzburg, Feb. 17, 1796; d. Munich, Oct. 18, 1866. His books on the Japanese, their language, customs, flora and fauna, did much to make Japan known to the western world. His works include *Nippon, Archiv zur Beschreibung von Japan* (1832–1851); *Fauna japonica* (1833); *Flora japonica* (1835); *Bibliotheca japonica* (1833–1841); *Epitome linguae japonicae* (1826–1853); *Florae japonicae familiae naturales* (1851).

SIEDLCE, or **SYEDLETS,** city of Poland, about 60 miles east of Warsaw in the department of Lublin. It is approximately the same distance west of Brest Litovsk. In 1906 it was the scene of a Jewish massacre. It suffered greatly during World War I and in the succeeding Russo-Polish War. The Poles recaptured it from the Russians in 1920. When Germany defeated Poland at the commencement of World War II and partitioned the country with Russia, Siedlce was included in the German area. On July 31, 1944, the German defenses fell before the Russian advance on Warsaw under Gen. K. K. Rokossovsky. Pop. (1940) 36,927.

SIEGBAHN, sēg'bän, **Karl Manne Georg,** Swedish physicist: b. Orebro, Sweden, Dec. 3, 1886. After receiving the degree of doctor of science at the University of Lund in 1911, he was a lecturer there until 1920 when he became professor and head of the physics department. From 1923 to 1937 he headed the physics department of the University of Uppsala. In the latter year he was appointed research professor and director of the Nobel Institute for Physics in Stockholm's Academy of Science. He is the recipient of many awards including the Nobel prize for physics (1925) and the Royal Society's Hughes Medal (1934) and Rumford Medal (1940). He is a contributor to scientific journals and wrote *The Spectroscopy of X-Rays* (1925).

SIEGBURG, zēĸ'bo͝orĸ, city, Rhine Province, Prussia, Germany, on the Sieg River, 14 miles southeast of Cologne. Pop. (1939) 19,405.

SIEGE. Three important elements are necessary to insure the success of a siege. First, the force of the besiegers must be sufficient to overcome the besieged in actual combat, man to man. If this is not the case the besieged, by a sortie, might destroy the opposing works, and drive away the besiegers. The second element is, that the place must be invested; so that no provisions, reinforcements, or other aliment of war can enter. The third element is, that the besiegers be undisturbed from without. For this it is essential that there shall not be a hostile army in the neighborhood; or, if there be, that the operations of the besiegers be protected by a covering army able to cope with the enemy's force in the field. The ancients executed gigantic works to produce these effects. To complete the investment, they built a high and strong wall around the whole fortress; and to render themselves secure from without, they built a similar wall facing outwards, beyond their own position. The first was circumvallation, the second contravallation. It was thus that Caesar fortified himself while besieging Alexia, and maintained 60,000 men within his ring. In modern warfare, it is considered preferable to establish strong posts here and there round the place, and merely sentries and vedettes between.

The first step toward the reduction of a fortress is to cut off communication of the occupants with the outside world. This is done by a rapid movement of a relatively small force followed by reinforcements sufficient to hold a line entirely around the place and beyond the range of its artillery. This line is called the "Line of Investment," and the belt of territory immediately outside of it occupied by the investment force is called the "zone of investment." Whether this line must be occupied continuously will depend upon its nature. As much must be actually occupied or commanded as could be used by the besieged for exit or entrance. The line of investment is divided into sections, preferably so chosen that a unit of command can be assigned to each.

Troops assigned to a section of the zone of investment begin at once to reconnoiter it and put it in the best possible state of defense. Artificial or accidental features are prepared and strengthened, intrenchments thrown up where required, communications made and improved through and between sections and telegraph and telephone lines established around the zone and to headquarters. Every means must be utilized to gain knowledge of the ground inside the zone. The time which must elapse before the siege material can be brought up will permit a great deal of such work to be done.

The real attack or systematic approach is pushed inward from a few points only of the zone of investment, usually one or two. The side on which these approaches are made is determined by the following conditions: (1) The best communication with the base; (2) The best terrain for battery positions and approaches under natural cover; (3) The most favorable ground for construction and operation of siege railways; (4) The easiest digging; (5) The most important consequences of success.

The first condition is usually controlling, unless one of the others is prohibitory. If the zone of investment is favorable and ample siege railway equipment is available, the attack may be conducted from points somewhat removed from the main terminus of the supply line. The main defensive line of an important fortress consists of a series of detached forts. To breach such a line one fort at least, more often two, must be taken, and during the operation the fire of the one on each side must be kept down. If two forts are to be reduced, the siege consists of artillery work against four and trench work against the middle two of these. When the front of attack is decided the main engineer park is located out of reach of the defenders' artillery, convenient to the front selected and to the main supply line, and connected with the latter by good communications. Here is assembled all the siege material pertaining to engineering operations as fast as it arrives, to be sorted and arranged in convenient shape for selection and forwarding to the front as required. Sites for the main siege batteries are next selected, at moderately long range from the forts, 2,500 to 4,000 yards, and for intermediate parks near them to con-

tain materials for the construction, repair and supply of batteries. These sites are connected by a belt railroad immediately in their rear, and the belt line is connected with the main park at one or more places.

The complete investing force must be heavily reinforced, ordinarily about doubled, before siege operations on any considerable scale are undertaken. The additional force is concentrated along the front of attack, mainly toward its centre. This and the investing force along the front of operations are sometimes called siege troops, and the remainder of the investing force distinguished as investing troops. The siege force should consist of infantry, engineers and artillery in the proportion approximate of 83 per cent, 5 per cent and 12 per cent, respectively, with the proper contingent of the signal and hospital corps and supernumerary engineers and ordnance officers. The total attacking force ranges from two and one-half to four times the strength of the garrison. The siege artillery is disposed in batteries of four pieces or less, dispersed as much as concentration of fire will permit, and sited when possible on the reverse slopes of ridges or hills or behind timber, and employs indirect fire almost exclusively. Though batteries are invisible, the high-angle fire of the defense reaches them, as the enemy's artillery systematically searches all reverse slopes within range, and the effect of shells must be localized by artificial cover. An emplacement for each gun is best.

First Parallel.— When the siege batteries have brought the artillery fire of the defense under control, the first attempt to gain ground to the front is made by opening a trench generally parallel to the line of investment and, if possible, within 1,200 yards of the enemy's main line. During the day the outposts are advanced to or beyond the proposed line, to permit it to be reconnoitered and its bearings noted. At night the attack is pushed more strongly and the enemy driven in as far as possible for the greater safety of the working parties. As soon as it is dark enough for concealment the tracing is begun. Each party consists of one engineer officer, one non-commissioned officer and a private for each 50 yards of line to be traced. Approaches or zigzag trenches must be traced and dug on the same night with the first parallel, connecting it with cover in the rear. There should be at least three such approaches — at right, left and centre. The tracing of approaches for simultaneous digging differs in detail but little from that of the parallel. It is more difficult because the line is broken and greater accuracy is required. The digging of approaches under fire differs from ordinary trench work in that it is done progressively from one end and with the men reasonably protected from fire while doing it. Tracing is dispensed with. Approaches are usually called «saps,» the operation of digging them «sapping,» and the skilled men «sappers.» The end at which digging is in progress is called the saphead.

Single Sap.—A party of one non-commissioned officer and eight sappers in two reliefs work at the saphead. The two leading sappers, Nos. 1 and 2, excavate a trench four and one-half feet deep and just wide enough to work in, throwing the earth to the front of the exposed side. They are protected in front, or on the end of the trench, by a pile of half-filled sand bags, 50 or 60 in number, piled so as to make a parapet two feet high. The sand bags should be smeared with mud so as to show the color of the soil. No. 1, kneeling or crouching, undercuts the end breast a few inches and brings down the earth. He steps back and No. 2 takes his place and shovels the loose earth out. No. 1 returns, throws forward as many sand bags as may be necessary to gain ground, using a fork or rolling them over with his hands. He then undercuts again and the operation is repeated. Nos. 3 and 4 widen the trench two feet and raise the parapet, also forming a berm 12 to 13 inches wide. The rate of advance of a sap is only two to four feet an hour. When half a yard has been gained, Nos. 1 and 2 exchange places, and when a yard is gained the other relief comes in. At each change of reliefs the men who were Nos. 3 and 4 on the last tour take 1 and 2. Casualties are made up from the waiting relief. Generally, unless reduced to less than four men, the detachment must work without reinforcement until the regular change of trench relief. A working party of infantry, 25 feet in rear of the sappers, widens the trench to 10 feet.

Double Sap.— Two parties work parallel to each other, Nos. 1 and 2 leaving a four-foot tongue between them, which is taken out by Nos. 3 and 4. No widening party is required. To prevent enfilade the direction of the trench is changed at right angles as soon as the plunging fire becomes too annoying. After going 25 to 30 feet laterally, the trench turns again to the front, and, after having advanced sufficiently to form a traverse, turns again to the right until it reaches the original line, when it resumes the main direction.

Second Parallel.—The first infantry position established, a second one well advanced is the next objective. It is called the «second parallel» and should be 500 or 600 yards from the enemy's works, or about midway in front of the first parallel. It will develop only the work selected for attack and will thus be shorter than the first. The second parallel, and the approaches to it from the first, may be established in a night, like the first parallel and its approaches, though this will be the exception. With an alert defense the advance from first to second parallel must be by sap. When the heads of the saps are abreast of each other and on the desired line, they may be turned toward each other and run to a connection, forming the second parallel, though, if possible the work should be expedited by extending parties for simultaneous work.

Third Parallel.—This is about halfway from the second parallel to the enemy's works and is in most cases the position of assault, though sometimes fourth and even fifth parallels have been found necessary. At this close range attention is necessary to guard the sapheads, which can be done by machine guns and rifle fire from the second parallel. As the saps advance the returns may be lengthened and turned so as to form demi-parallels. This enables a stronger guarding force to be kept under shelter and well advanced to repulse sorties or to take the offensive if opportunity offers.

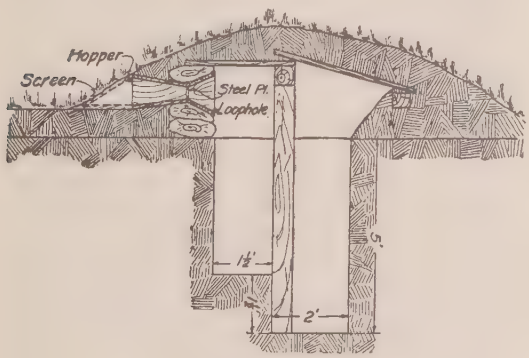
Simultaneous Work.— The preceding shows

the systematic method of procedure with the least losses. However, if the enemy's artillery is fairly well under control and if the terrain is at all suitable, two or more of the parallels or demi-parallels may be constructed at the same time. This result is obtained by sending working parties at night to the position of the advanced parallel or demi-parallel, and these parties hurriedly construct enough of the parallel to obtain shelter against the enemy's fire. During the day and subsequent nights this parallel is completed and the approaches to it are more quickly constructed because working parties are actively engaged at both ends. It is quite often necessary to construct a fourth and fifth parallel in order to maintain troops near the sapheads and protect the sappers at work.

The developments during the great World War and the methods of conflict in trench warfare due to the advances in science, hand grenades, bombs, obstacles, etc., have brought about important changes in the old methods of siege warfare. The essential difference between capture of entrenched places and victory over extended entrenched fronts lies in the fact that the garrison only of the fortress must be subdued while the nation back of an extended front well entrenched must be conquered. While the garrison of a fortress still retains numbers, food, ammunition and morale it may be possible to capture local strong points, but the garrison will not surrender as long as its power of resistance is not broken; other strong points to the rear will be occupied and the resistance continued. It is thus seen that the real objects of trench warfare are to capture local strong points and to break down the resistance of the enemy, making the following general principles self-evident:

(1) Advance in the open is impossible against enemy fire superiority.

(2) Advance by open sap work is difficult against enemy artillery fire and almost impossible if the enemy has artillery fire superiority.



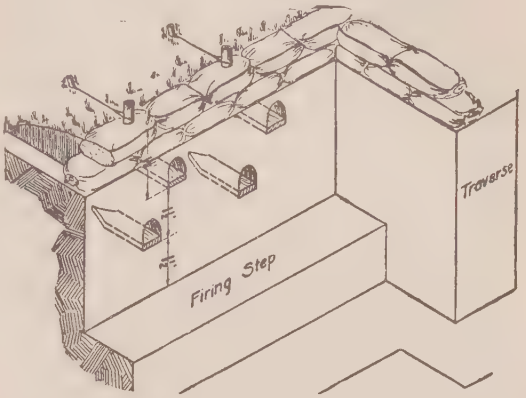
Enclosed Trench.

(3) Advance by mining is effective if the enemy has artillery fire superiority.

(4) An assault against an alert enemy must be preceded by an effective fire of artillery explosive shells to destroy somewhat the enemy trenches and obstacles.

(5) An artillery curtain of fire must be maintained beyond captured enemy trenches in order to assist the successful attackers in defending the captured trenches against counter attack.

The situation on the west front in Europe illustrated the effect of having masses of trained men facing each other on a relatively short line. From the North Sea to the boundary of Switzerland the battle line extended over a distance of 430 miles. The opposing armies had each constructed triple lines of



Sortie Steps in Face of Trench.

trenches, often supplemented in the rear by a double line of underground shelters where the troops in reserve might rest. Many miles of passageways, saps, galleries and zigzags afforded means of communication between the trenches. At a number of points the hostile lines were less than 100 yards apart and grenades of all types were used in great quantities. There were no flanks to turn, the lines were heavily covered by obstacles, and each side having reserves upon reserves, sapping and mining was freely resorted to in order to gain ground.

The observation of the enemy is of the greatest importance in trench warfare. It should give complete knowledge of all the elements of the hostile line and prompt information of any movement of the enemy. It is effected by observation from the ground and observation by aircraft. Observation from the ground is divided into three echelons: (1) observation in front of the firing line from small posts and listening posts. (2) Observation on the firing line by sentinels and lookouts. (3) Obersvation in rear of the firing line, by artillery observers, sentinels and lookouts of the shelters.

The location of the lookout posts and observatories are determined in accordance with a complete plan for each supporting point or sector of defense. No part of the hostile front should be free from observation and the parts of the front favorable for the attack of the enemy should be specially watched. An observatory should be located near the command posts of the commanders of strong points, supporting points and sectors. Those of the last two must have extended views over the whole of the terrain.

During a bombardment, the maintenance of lines of information becomes very difficult, but it must be accomplished by all possible methods, such as: (1) Installing telephone under strong shelters. (2) Using lead-covered cable, buried six feet deep, especially for the

lines connecting the regimental, brigade, division and corps headquarters. (3) Placing rockets in all shelters and observatories where officers or non-commissioned officers are posted. (4) Preparing posts for visual signaling, safe from bombardment and defiladed from view of the enemy. These posts are constructed in shelters similar to those for searchlights and are provided with horizontal loopholes with openings to the flank or rear.

Battle-field illumination is a necessity whereever night attacks may be expected. Portable searchlights, both animal and motor drawn, in units up to 36 inches, are now an accepted part of every army. In addition to these powerful lights, trenches are supplied with storage battery or gas reflector lights, star-bombs, rockets and flares, arranged so that they can be put into action instantaneously when an enemy approaches. The entire foreground and obstacles must be illuminated, leaving the defenders in shadow. If a light is used too close to the defenders' parapet, they themselves are illuminated and the light becomes a source of danger.

The use of asphyxiating gases as an auxiliary, both in attack and defense, was frequent in the World War, but was confined to operations where the combatants were facing each other in trenches under conditions similar to a siege. Chlorine or bromine fumes, or a mixture of the two, were the gases most commonly employed. Chlorine and bromine cause death through strangulation by effect on the bronchial tubes and if death is avoided a long, slow, bronchial illness ensues. *Mustard gas* because of its persistency and effectiveness in low concentrations was used ordinarily, in the World War, to gas large areas. For this purpose accuracy in hitting a given point was not necessary and hence the increase in the dispersion of shots at longer ranges was not taken into account as in the case when it was desired to hit a given point. Likewise the number of guns required to cover a given area was small. The high explosive shell, however, changes this method of firing. Since it is deadly both as a high explosive and as a gas, it can and will be used against small targets. In fact, it will be used exactly as high explosive is used, with the single exception that care must be taken to allow sufficient time for the gas to disperse if it is desired to occupy the places bombarded with the gas.

Mounting heavy artillery on railway cars has in no small degree affected siege operations. The idea of so mounting artillery was not born of the war with Germany. The idea was originally American, the first authenticated record of such employment being by the Union forces at the siege of Richmond in 1863, when a 13-inch cast-iron mortar was mounted on a reinforced flat car. In 1913 the commanding officer of the defenses of the Potomac recommended that artillery of various calibre be mounted on railroad platforms, with ammunition, range-finding and repair cars making up complete units, so that this armament could be quickly transported at any time to the place where most needed. It was then apparent that guns in *fixed positions,* of whatever calibres, violated the cardinal military principle of mobility. Of late railway artillery has come to be as varied in its design as field artillery, each type of railway mount having certain tactical uses, the three types of cannon used being mortars, howitzers and guns. The general types of railway mount adopted are those which give the gun all-around fire (360-degree traverse), provide limited traverse for the gun and allow no lateral movement for the gun on the carriage, but are used on curved track to give the weapons traverse aim. When war was declared against Germany the guns in the United States available for mounting on railway cars are shown in the following table:

NUMBER OF GUNS	Size	Length
	(*Inches*)	(*Calibres*)
12	7	45
96	8	35
129	10	34
49	12	35
6	12	50
150 (Mortars)	12	10
21	14	50

The smaller weapons, such as the 7-inch and the 8-inch guns and the 12-inch mortars, were placed on mounts affording 360-degree traverse. The limited traverse mounts were used for the moderately long-range guns and howitzers. The fixed type of mount was used for long-range guns only, including the sliding railway mounts, such as the American 12-inch and 14-inch sliding mounts and the French Schneider à glissement mounts.

In siege operations, as the result of experience, railway artillery is practically confined to the Barbette, Schneider and Batignolles types of gun mounts. The *Barbette* carriage revolves about a central pintle or axis and turns the gun around with it. In the *Schneider* railway mount the gun and its carriage are fastened rigidly parallel to the long axis of the railway car. Thus the gun itself, independently of any movement of the car, can be pointed only up and down in a vertical plane, having no traverse or swing from left to right, and vice-versa. In order to give the weapon traverse for its aim, special railway curved tracks, called epis, are prepared at the position where it is to be fired. The car is then run along the curve until its traverse aim is correct and the vertical aim is achieved by the movement of the gun itself. In the *Batignolles* type the gun and cradle are mounted on a so-called top carriage that permits of small changes in horizontal pointing right and left. Thus with the railway artillery of the Batignolles type, also, track curves, or epis, are necessary for the accurate aiming. This mount partially cushions the recoil by the movement of the gun itself in the cradle.

While siege operations are largely modified by the advent of military aeronautics, the changes are not great because of the limited weight that the largest airship can carry. The effects of the largest bombs are less terrifying and important than those of the enormous number of gun projecticles, which are thrown with greater accuracy and usually from guns that cannot be seen by those attacked or besieged.

EDWARD S. FARROW,
Late Consulting Military and Civil Engineer.

SIEGE ARTILLERY. See ARTILLERY.

SIEGE GUN. See ARTILLERY; FORTIFICATIONS.

SIEGEN, zē'gĕn, **Ludwig von,** German-Dutch inventor: b. Utrecht, 1609; d. Wolfenbüttel, 1680. He was a lieutenant in the Hessian army and invented the art of mezzotint engraving which was learned from him by Prince Rupert and so introduced into England. His first work was a portrait of Amelia Elizabeth, mother of the landgrave of Hesse (about 1640).

SIEGEN, Germany, Prussia, a town in the province of Westphalia, on the Sieg River, 47 miles east of Cologne by rail. Two castles, belonging to the period of the Principality, are in this town, several Protestant and Catholic churches, a monument to William I and a bronze bust of Bismarck. It has important mining and manufacturing interests and is the centre of the mining industry of southern Westphalia. It has large tanneries, foundries, factories for cloth, linen, soap, leather and paper, etc. There is a school of mining. Siegen is supposed to be the birthplace of Rubens. Pop. about 30,000.

SIEGFRIED LINE. See FORTIFICATIONS.

SIEGFRIED, sēg'frēd (Ger. zēg'frēd). See NIBELUNGENLIED.

SIEMENS, zē'mĕns, **Ernst Werner von,** German engineer and electrician: b. Lenthe, Hanover, 13 Dec. 1816; d. Berlin, 6 Dec. 1892. He entered the Prussian artillery in 1834 and took out his first patent in 1842 for a process of silver and gold electro plating. In 1842 he went to England with his brother, Karl Wilhelm, to establish the business known there by the firm name of Siemens Brothers. In 1844 he took charge of the artillery workshops in Berlin. He aided in developing the telegraphic system in Prussia, and discovered the insulating properties of gutta-percha, which is utilized in underground and submarine cables. He left the army in 1849 and devoted his energies to electrical business, particularly the construction of telegraph apparatus. The first great continental telegraph line, that between Berlin and Frankfort-on-the-Main, was built by him in 1849, and the firm of Siemens Brothers laid six Atlantic cables. The pneumatic-tube system was invented by him and also various modifications of self-acting dynamos. In 1886 he gave 500,000 marks to found an institute of physics and technology. He published 'Positive Vorschläge zu einem Patentgesetz' (1869); 'Gesammelte Abhandlungen und Vorträge' (1881); 'Wissenschaftliche und technische Arbeiten (1889–91); 'Lebenserinnerungen' (1892). His collected 'Papers' were translated into English (1892–99), also his 'Recollections' (New York 1893).

SIEMENS, SIR **Karl Wilhelm,** German-English physicist and inventor: b. Lenthe, Hanover, 4 April 1823; d. London, 19 Nov. 1883. He was educated at the gymnasium at Lübeck, the polytechnic school at Magdeburg and the University of Göttingen. At 19 he became a pupil in the engine works of Count Stolberg, and a year later visited England for the purpose of introducing a method of electro-plating, the joint invention of his brother Werner and himself. In the same year the brothers invented a differential governor for steam-engines, and in 1844 he again went to England to patent this invention. From that time he settled in England, becoming naturalized in 1859. Among the many other inventions with which he, in combination with his brothers, must be credited, are the regenerating gas furnace for metallurgical purposes, the process of making steel and iron direct from ore, which has revolutionized the steel and iron trades, and improvements in the manufacture and laying of telegraph lines. He was elected to the Royal Society in 1862; was one time president of the British Association; and was knighted in 1883. He published 'On the Utilization of Heat and Other Natural Forces' (1878); 'The Dynamo Electric Current and its Steadiness' (1881); 'On the Conservation of Solar Energy' (1883). His 'Scientific Works' were edited by E. F. Bamber (1888). Consult Pole, Dr. 'Life of Sir William Siemens' (London 1888); 'Dictionary of National Biography' (London 1897); *The Times* (London, 20 Nov. 1883).

SIEMERING, zē'mĕr-ĭng, **Rudolph,** German sculptor: b. Königsberg, 10 Aug. 1835; d. 23 Jan. 1905. He attended the local Art Academy in youth and afterward became the pupil of Blaser in Berlin. For the decoration of Königsberg University he furnished medallion portraits of its learned men. In 1860 he produced his 'Penelope' and in 1860 a sitting figure in marble of King Wilhelm for the Exchange in Berlin; and a terra-cotta statue of Leibnitz for the Academy of Science at Perth, productions remarkable for realistic modeling and imposing expression. In 1871 he executed the masterly relief 'Uprising of the People at the Summons of their King'; and the following year a design for the Goethe monument. His next work was the statue of Frederick the Great for Marienburg. The greatest of his works, however, was the war monument in the market place at Leipzig, 'Germany,' as an armed heroine. Worthy also of special notice was the sitting statue of Emperor William I with the four colossal equestrian figures — King Albert of Saxony, Emperor Frederick, Bismarck, Moltke and eight figures of soldiers. He was the author of the colossal equestrian statue of Washington whose pedestal is enriched with reliefs and accessory sculptures. This impressive monument was unveiled in Fairmount Park, Philadelphia, May 1897. Siemering's group, 'Saint Gertrude Hospitably receiving a Traveling Scholar,' was finished and set upon the Bridge of Saint Gertrude at Berlin in 1896. He was also the author of numerous portrait busts.

SIEMIRADZKI, syĕm-ĭ-räz'kĭ, **Henryk,** Polish painter: b. near Kharkov, Grodno government, 15 Nov. 1843; d. 1902. He studied art in the Academy of Saint Petersburg and after a sojourn in Munich, fixed his studio in Rome. Among his best canvases are 'Nero's Torches' (1876) now in the National Museum, Cracow; 'The Vase or the Slave' (1879); 'The Amulet-Seller' (1888); 'Christ Stilling the Waves'; 'The Sword Dance' (1880); 'Phryne at Eleusis' (1889), in the Alexander Museum, Petrograd; 'Christ with Martha and Mary' (1886). He also decorated with much skill two ceilings in the Netchaïev Palace of Petrograd and several churches of Cracow and Moscow.

SIENA, syâ'nä, Angl. sĭ-ĕn'à, province, Italy, in Tuscany, comprising hills and mountains of the Tuscan Apennines between the Chianti Mountains in the northeast and the Monte Amiata group in the southwest. The area is 1,475 square miles, with the Ombrone, Elsa, and Arbia the chief rivers. The valley farms yield olives, cereals, grapes, and other fruits. Livestock too is raised. Much of the famous Chianti wine comes from the province. There are also mercury mines and quarries that yield travertine and a fine orange-colored marble. Siena, the capital, San Gimignano, Montepulciano, and Poggibonsi are the principal centers. A railway line from Empoli to Chiusi crosses the province and has a branch running to the coast to Follonica. Pop. (1951) 277,036.

SIENA, commune and city, Italy, the capital of Siena Province in Tuscany. The city is 30 miles south of Florence on a plateau about 1,000 feet high, in the midst of hills covered with vineyards and olive groves. The atmosphere has changed little since the Middle Ages. In its landmarks and plan Siena is still a 14th century city, with narrow, irregular streets and small, picturesque squares lined with old palaces and medieval houses. In the center of the city is a wide, shell-shaped square, the Campo, dominated by the imposing Palazzo Pubblico with the tall and slender Torre del Mangia. This is the finest Gothic town hall in Tuscany. Among its works of art are Simone Martini's *Maestà* and frescoes by Ambrogio Lorenzetti. In the square also are the Loggia della Mercanzia and the Fonte Gaia, a fountain by Jacopo della Quercia; copies replace his original sculptures now in the municipal museum. The famous *Corsa del Palio*, a festival of medieval origin, is still held twice every summer in the Campo. It consists of a parade and a horse race, the oldest in the world. The paraders, in colorful medieval costumes, represent each of the city's 17 quarters (*contrade*), and in the horse race, each horse runs under the colors of one of the 10 *contrade* chosen to take part in the race.

Siena's beautiful cathedral (12th–14th century) has a polychrome marble façade. The lower part, by Giovanni Pisano, is Romanesque; the upper part is a striking example of Italian Gothic. Walls and columns of the interior are covered with stripes of black and white marble, and the marble floor is beautifully inlaid. The sculptured pulpit is by Nicola Pisano, aided by his son Giovanni and others. The high altar is by Baldassare Peruzzi. The adjacent Piccolomini Library, founded about 1495 by Francesco Piccolomini (later Pope Pius III), has frescoes by Pinturicchio (1502–1509). Near the cathedral are the baptistery, with a beautiful baptismal font by Jacopo della Quercia and works by Donatello and Lorenzo Ghiberti, and the Museo dell'Opera del Duomo. Among the city's fine churches are Sant'Agostino, Fontegiusta, Santa Maria dei Servi, and San Francesco.

In the 14th-century Bonsignori Palace is the art gallery, a collection of paintings of the Sienese School, which produced its greatest masters in the 13th and 14th centuries with Duccio di Buoninsegna, Simone Martini, Lippo Memmi, and Pietro and Ambrogio Lorenzetti. Other palaces of that period are the Piccolomini, Tolomei, Sansedoni, and Saracini. The home and shrine of Saint Catherine of Siena, who was born and lived here, contains many relics. Scenes of her life, painted by Sodoma, are in the Church of San Domenico. Siena has fine cultural traditions dating back to the 13th century, when its university was founded. There are many academies and learned societies, a municipal library, and a museum of antiquities.

Siena was an Etruscan settlement long before Roman times, but we do not know its Etruscan name. Under a Latin name it first appears in history as a Roman colony in the times of the emperor Augustus. Later it was held by Goths, Lombards, Franks, and local feudal lords, over whom the bishops finally gained ascendancy. In the 12th century a free commune was formed, which gradually extended its power over the countryside and soon became the champion of the Ghibelline cause in Tuscany. Meanwhile the Guelph city of Florence also tried to enlarge its possessions. The ensuing political and economic rivalry soon led to a series of wars, fought with varying fortunes. After its victory over Florence at Montaperti in 1260, Siena reached its highest intellectual, artistic, and economic development. In the 14th and 15th centuries, however, external wars and internal strife between Guelphs and Ghibellines (q.v.) and between the aristocratic and popular factions gradually weakened the republic. From 1497 to 1512 Pandolfo Petrucci held power and tried to restore order, but his son was forced into exile in 1516. French and Spaniards fought over Siena, and in 1554 troops of Emperor Charles V put the city under siege. After a long and gallant struggle to save their republican liberties the defenders were forced to capitulate in April 1555. Charles V invested his son Philip with Siena, but in 1559 the city passed to the Medici, and remained a part of the Grand Duchy of Tuscany until 1860, when it joined Piedmont and later became part of a united Italy. Siena suffered little during World War II, but several private art collections were looted by the Germans.

There are no important industries. Silk and cotton textiles are manufactured, as well as handmade leather objects, wrought iron, ceramics, and fine furniture. Pop. of the commune (1951) 52,226.

SIENNA, sĭ-ĕn'à, a natural pigment consisting of clay colored by iron and manganese oxides, brownish yellow in its raw state and orange-brown when burnt. Its name derives from Siena, Italy, where one of the finest deposits has long been worked. Sienna dates from the time of the pre-civilization cave dwellers, and has been used in all periods of European art. It is indispensable to the modern paint industry.

SIENKIEWICZ, shĕn-kyĕ'vĕch, **Henryk**, Polish novelist: b. Wola Odrzejska, near Lukow, Poland, May 4, 1846; d. Vevay, Switzerland, Nov. 14, 1916. Educated at the University of Warsaw, Sienkiewicz published various critical articles (1869) while still a student, was for a time editor of *Słowo*, a journal published in Warsaw, and in 1872 published his first work of fiction, *Na Marne*, rendered into English by the official translator, Jeremiah Curtin, as *In Vain*. In 1876, Sienkiewicz came to the United States, where for a time he lived in California in a Polish colony founded by the famous Polish-American actress Helena Modjeska and her husband. His travels took him to most of the European countries and even into central Africa. Among his chief works are the

following, nearly all translated by Curtin: *With Fire and Sword* (1883), *The Deluge* (1886), and *Pan Michael* (1888)—the three forming a great patriotic trilogy which deals with Poland's struggle for freedom in the 17th century and is regarded as Sienkiewicz's finest work; the two distinguished psychological novels *Without Dogma* (1891) and *Children of the Soil* (1895); *Quo Vadis?* (1895; English tr. 1896), a tale of Roman life under Nero, by far the author's most popular work; and *Knights of the Cross* (1900). *Quo Vadis?* has been translated into nearly every modern language and dramatized and filmed with great success.

In 1905 Sienkiewicz received the Nobel Prize in literature. During World War I he worked untiringly for Polish independence and for the International Red Cross. It was in the midst of these labors that he died. The vast majority of the people of Poland regard him as their authentic national voice.

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SIERRA LEONE, sĭĕr'ä lē-ōn'; sĭr'ä, a British colonial territory (area 27,925 square miles) in British West Africa, consisting of a colony (256 square miles) and a protectorate (27,669 square miles). Roughly circular in shape, it lies between 6°55′ and 10°N. and 10°16′ and 13°18′W. Its 210-mile seacoast extends from French Guinea to Liberia. The colony consists of the Sierra Leone Peninsula, Sherbro Island, and other small islands. About 25 miles long and 10 to 12 miles wide, the peninsula consists of thickly forested igneous mountains rising to between 2,000 and 3,000 feet. Freetown (pop. 1954, 70,000), at the northern end of the peninsula, has one of the finest natural harbors in West Africa. The coastal strip of the protectorate is low and flat. In the west and south are rolling wooded areas, with hills of 1,000 feet or more. The upland plateau in the north and east lies at about 1,500 feet; the Sula and Kangari hills stand nearly 3,000 feet high, and the Tingri range rises to over 6,000 feet. Rivers and streams flowing into the Atlantic provide useful waterways, especially during the rainy season from May to October. Between December and February the dry northeasterly harmattan blows from the Sahara. Freetown's mean annual temperature is 80°F., its rainfall 135.81 inches. The total population was 2,005,000 in 1952 (mid-year estimate), of which about 2,000 were African and 1,000 Europeans.

All land belongs to the indigenous population, but, with the consent of the Tribal Authority and the District Council, non-natives may lease land for a term not exceeding 50 years. About 23,848 square miles are suitable for agriculture. The main crops are palm oil, palm kernels, piassava fiber, rice, cacao, coffee, peanuts, cassava, beniseed, kola nuts, bananas, and ginger. Animal husbandry is hampered by endemic animal and fowl disease. Mineral rights are held by the crown, and prospecting and mining rights are granted by the governor. Diamonds, chrome ore, iron ore, and gold form the chief mineral resources.

Total imports in 1954 amounted to £13,376,250, of which the chief items were cotton and artificial silk piece goods, clothing, machinery, iron and steel manufactures, and bags and sacks. Exports in 1954 totaled £11,398,305, most important of which were palm kernels, palm oil, cacao, diamonds, peanuts, coffee, beniseed, and minerals.

The state-owned Sierra Leone Railway has a total length of 337 miles; the Sierra Leone Development Company, Ltd., operates a 57½-mile freight line. There are between 2,500 and 3,000 miles of road, over 100 miles of it paved. Freetown is the chief harbor, but Pepel, Bonthe, and Sulima are loading ports for local produce. Freetown airport (at Lungi) is the only international airport. A telephone system links the major towns, and in Freetown there is a wired broadcasting system. Direct broadcasting was planned to come into operation in 1955.

Of the 372 primary and 20 secondary schools and post-primary departments in 1954, 19 were run by the government and 266 by missionary societies and local authorities assisted by the government; 107 were unassisted. The Labour Department maintains a technical training center at Wilberforce, and the Education Department provides commercial classes for clerks in government service. Fourah Bay College (affiliated with the University of Durham) offers courses in divinity, arts, commerce, and education. Five teacher training colleges and two teacher training departments also exist. Scholarships for secondary education and study abroad are liberally awarded.

Hospital facilities are provided by the government and by missions and mining companies; a total of 1,124 beds was available in 1953. There were also 29 government dispensaries.

The territory is governed by an Executive Council and a Legislative Council. The former, under the presidency of the governor, has four ex officio members and six ministers appointed from the elected members of the Legislative Council. The prime minister is the leader of the majority party in the Legislative Council, which is made up of the governor as president, a vice president, seven ex officio members, 21 elected members, and two members nominated by the governor. Local government is in the hands of area, district, and urban councils. Elections are both direct and indirect, and plans for a greatly broadened franchise have been approved.

Sierra Leone was discovered in 1462 by Pedro de Cintra, a Portuguese adventurer. For some two centuries it helped supply the slave trade. In 1788, the native chiefs ceded a portion of land to Capt. John Taylor, to be used as a settlement for slaves freed and destitute in England. When Great Britain abolished the slave trade (1807) it became a base for enforcing abolition. Africans repatriated from North America and those rescued from slave ships enlarged the population. Treaties with neighboring chiefs resulted in further territorial growth, and by 1911 the boundaries were stabilized. During World War II, Freetown harbor was a staging area for convoys.

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RICHARD WEBB.

SIERRA MADRE, sĭ-ĕr'ä măd'rē; mä'drä; Span. syĕr'rä mä'thrä, (1) A range of mountains in southern California, in Los Angeles and adjoining counties. (2) A range in the southern part of Wyoming in Carbon County. (3) The range in Mexico bordering the plateau on the west. It is a continuation of the range on

the western border of the Great Salt Lake Basin in the United States. In Mexico, the range is sometimes called Sierra Madre del Pacifico. The Sierra Madre del Sur is located in southern Mexico. (See MEXICO—*Topography*) (4) One of the three principal mountain ranges in the eastern part of the island of Luzon, Philippines.

SIERRA MORENA, sĭ-ĕr'ä mō-rā'nä, southwest Spain, an irregular mountain chain which cuts across the provinces of Huelva, Badajoz, northern Seville, central Cordova, Jaen, southern Ciudad Real, and Albac. It forms the watershed between the Guadiana and Guadalquivir rivers and separates the plateau region of Castile and Estremadura from Andalusia (q.v.). In the west, the range includes the Sierra de Aracena, and in the east, the Sierra de Alcaraz near which is located the famous pass, Despenta Perros.[1] Sheep graze in the Cordova pastures, and the range is fertile in minerals including mercury, lead, zinc, iron, and the copper mines at Tharsis and Rio Tinto.

SIERRA NEVADA, sĭ-ĕr'ä nĕ-vä'dä (Span. for snowy range), a mountain range in eastern California, the geological development of which took place over a period of 50 million years. While it is the general opinion of geologists that the area is a tilted block of the earth's crust, conflicting views exist on the manner in which the dislocations took place. It ranges from about 430 miles long to 40 to 80 miles wide and is broad enough to bear several mountain systems on its back with altitudes up to 14,495 feet. Rising abruptly along the eastern side of a great fault escarpment facing Owens Valley, it slopes westward toward the Great California Valley.

In March 1772, Capt. Pedro Fages and Father Juan Crespi were probably the first white men to see the Sierra Nevada. Subsequent discoverers and explorers included Pedro Font and Francesco Garces, April 1776; Lieut. Gabriel Moraga, 1805, 1808; Lieut. Luis Arguello, Ramón Abella, and Narcisco Durán, May 1817; Jedediah Strong Smith (d. 1831); Joseph Reddeford Walker, October 1833, 1834; John C. Fremont, 1844, 1845; George Donner, 1846–1847; and William Penn Abrams, 1849. The beginning of systematic exploration took place with Josiah Dwight Whitney, William H. Brewer, and Charles Hoffmann, 1864; Clarence King, 1871; A. H. Johnson, C. D. Bergole, and John Lucas, 1873; John Muir, 1869; and many others associated with the United States Geological Survey have done extensive work.

Among the tallest mountains with altitudes given in feet[2] are Mount Whitney, 14,495; Williamson, 14,384; North Palisade, 14,254; Russell, 14,190; Corcoran 14,093; Middle Palisade, 14,049; Langley, 14,042; Tyndall, 14,025; Humphreys, 13,972; Darwin, 13,841; Kaweah, 13,816; Brewer, 13,577; Goddard, 13,555; Ritter, 13,161; Lyell, 13,095; Dana, 13,055; Clarence King, 12,909; Conness, 12,561; and Matterhorn, 12,275. Several of the better known peaks are Banner, 12,962; Tower, 11,707; Cathedral, 10,938, and Stevens, 10,100. The principal passes are Kearsage, 11,823; Tunemah, 10,883; Granite 10,681; Tioga, 9,946; Sonora, 9,627; Carson, 8,650; Donner, 7,150; Beckworth, 5,250; and Walker, 5,248. Upper Kern Canyon attains a depth of 6,300 feet opposite Mount Kaweah; Middle Kern Canyon ranges from 4,000 to more than 6,000 feet.

The forests of the Sierra Nevada are varied but are for the most part famous for their cone-bearing trees. The life zones include the foothill country; the Transition zone, covering from 2,000 feet to 5,000 feet in altitude, includes Yosemite Valley, Mariposa Grove, and the Giant Forest in Sequoia National Park; the Canadian zone, ranging from about 5,000 feet to 7,000 feet; and the Hudsonian zone which extends from there to the timberline.

SIERRA NEVADA, the loftiest mountain range of Spain. It extends east and west through Granada and Almeria, terminating on the Mediterranean shore where it forms several promontories. Mica slate is its chief constituent, and vegetation is scanty except in the lower valleys. Snow remains on the peaks the greater part of the year and there are several glaciers, those on Veleta being the southernmost in Europe. Its highest peak, Mulhacén, with an altitude of about 11,420 feet, is covered by perpetual snow; Veleta, next in height, also has an elevation of over 11,000 feet.

SIEYES, syā-yâs', **Emmanuel Joseph,** French statesman: b. Fréjus, May 3, 1748; d. Paris, June 20, 1836. He began his studies at the University of Paris, and when the Revolution broke out he took an active part in furthering its progress, and wrote three pamphlets on the mode in which the three estates were to vote, whereby he was brought into very general and favorable notice. With him originated the idea of a new geographical division of France into departments, arrondissements, and communes. He also took an active part in the formation of the new constitution, and was in 1791 member for the department of the Seine. In 1792 he was deputy for the department of the Sarthe, but generally contented himself with merely recording his vote. During the Reign of Terror he withdrew into the country, but on the downfall of Robespierre he returned to the convention and took an active part in public measures, more especially foreign affairs, conducting several important negotiations with other states. In 1798 he went on a mission to Berlin, and succeeded in securing the neutrality of Prussia. On his return in 1799 he succeeded Jean François Rewbell as a member of the Directory, and shortly after succeeded in displacing three of his colleagues, so as to obtain a majority favorable to his views. He afterward, with the assistance of Joseph Fouché, closed the Jacobin Club. This measure made him very obnoxious to the extreme Republican Party, and under the conviction that faction was now to be kept down only by force he began to look out for a military leader. He thought of several, but fixed at last on Bonaparte. The revolution of the 18th Brumaire was the result; but Sieyès, who hoped he had only obtained a coadjutor, soon learned that he had subjected himself to a master. He did not, however, retire unrewarded, but proved that the simplicity and disinterestedness of which he had boasted were more nominal than real, by

[1] Variously spelled: Despenaperros, or Despienaperros.

[2] These altitudes have been supplied especially for this article by the United States Department of the Interior, Geological Survey, and are, as of July 1949, what they consider the best approximations of the elevations.

obtaining, along with the title of count, grants of lands and other property to the value of at least $250,000. He wrote 'Reconnaissance et exposition des droits de l'homme et du citoyen' (Paris 1789). Consult Boulay, 'Théorie constitutionelle de Sieyès' (Paris 1836); Beauverger, Edmond de, 'Etude sur Sieyès' (in 'Tableau historique du progrès de la philosophie politique' (ib. 1858); Bigeon, 'Sieyès' (ib. 1873); 'Cambridge Modern History' (Vol. VIII, New York 1904); Neton, A., 'Sieyès, 1746–1836, d'après des documents inédits' (Paris 1900); Mignet, F. A. L., 'Notices et mémoires historiques' (Vol. I, Paris 1843).

SIFFLEUR, an American ground squirrel, nearly equalling a rabbit in size, common in the Rocky Mountain region. It is so called from the loud eerie whistle with which it wakes the echoes of the crags about the lone pastures above timber line, where it makes its home; it was of great service to the mountain Indians. See MARMOT.

SIFFU, sēf-foo', or **SIBBU,** sēb-boo', a river of the island of Luzon, Philippines. It rises in the eastern part of the province of Bontoc and flows south and east through the province of Isabela to the Rio Grande de Cagayan; it is one of the most important tributaries of the Cagayan in Isabela.

SIFTON, Arthur Lewis, Canadian jurist and statesman: b. Saint John's, Ontario, 26 Oct. 1858; d. Ottawa, 21 Jan. 1921. He was educated at Wesley College, Winnipeg, and at Victoria University, Cobourg. He settled in the Northwest Territory in 1875 and in 1883 was called to the bar. He served in the legislature of the Northwest Territory in 1899–1903; was treasurer and commissioner of public works in the ministry of F. W. G. Haultain (q.v.); and in 1903–05 he was chief justice of the Supreme Court of the Northwest Territory. Upon the establishment in 1905 of the province of Alberta he became chief justice of its Supreme Court, and in 1910–17 he was premier of that province.

SIFTON, SIR **Clifford,** Canadian lawyer and statesman: b. Middlesex County, Ontario, 10 March 1861. He was graduated at Victoria University, Cobourg, in 1880, settled in Manitoba and in 1882 was called to the bar. He sat in the Manitoba Legislature, 1888–96; was Attorney-General and Minister of Education in the Greenway Administration, 1891–96, when he left to become Minister of Interior and Superintendent General of Indian Affairs in the Laurier Dominion Administration. In 1905 he resigned owing to a disagreement with Sir Wilfred Laurier over educational clauses in bills to establish the provinces of Alberta and Saskatchewan. Chairman, Commission Conservation of Natural Resources, 1909–18. He died in 1929.

SIGEBERT OF GEMBLOUX, sezh'bėrt' ov zhăn'bloo', Belgian mediæval chronicler: b. Brabant, c. 1030; d. Gembloux, 5 Oct. 1112. He early became a monk in the Benedictine abbey of Gembloux, where, with the exception of a period as a teacher at Metz, he passed all his life in teaching, and writing the works that have perpetuated his name. Chief of these is 'Chronographia,' covering history from 381 to 1111 A.D. It appears in 'Monumenta Germania historica Scriptores' (Vol. VI, ed. with introd. by L. C. Bethmann). Other works are 'Vita Sigeberti III regis Austrasiæ,' a life of the Frankish King Sigebert III; 'Gesta abbatum Gemblacensium,' a history of the early abbots of Gembloux to 1048; and the hagiographical biographies, 'Vita Deoderici, Mettersis episcopi,' a life of Bishop Dietrich of Metz, d. 984, who founded Saint Vincent's Abbey in that city; and 'Vita Wicberti,' a life of Wicbert or Guibert, d. 962, who founded the abbey of Gembloux. Consult Hirsch, S., 'De vita et scriptis Sigiberti Gemblacensis' (Berlin 1841); Molinier, A., 'Les Sources de l'histoire de France' (Vols. II and V, Paris 1902–04); Wattenbach, W., 'Deutschlands Geschichtsquellen' (Vol. II, Berlin 1894).

SIGEL, sē'gĕl, **Franz,** American military officer: b. Sinsheim, Baden, 18 Nov. 1824; d. New York, 21 Aug. 1902. He was graduated from the military school at Carlsruhe in 1843 and was commissioned lieutenant in the army, but resigned in 1847. In 1848 he raised a corps of volunteers to serve in the Baden insurrection and became commander-in-chief of the revolutionists. Arrested by the Swiss authorities in 1851 he escaped and in 1852 came to the United States. He settled in New York and conducted there a military magazine *Die Revue,* removing in 1857 to Saint Louis where he established a similar paper and also engaged in teaching. At the outbreak of the Civil War he organized a regiment for the Federal army and went to the front; participated in the battles of Carthage, Dug Springs and Pea Ridge; and in May 1861 was commissioned brigadier-general of volunteers. He was promoted major-general in 1862 and assigned to a corps in the Army of Virginia, which he commanded in the series of operations from Cedar Creek to the second battle of Bull Run. He was appointed to command the Western Pennsylvania Reserves in 1863 and in 1864 was transferred to the command of the Department of Western Virginia, successfully defending Maryland Heights against General Early's raid in July 1864, though his force was but 4,000 men against 15,000. He resigned his commission after the war, was editor of the Baltimore *Wrecker* in 1865–67 and later removed to New York. He was appointed collector of internal revenue in 1871 and elected registrar of New York in the same year. In 1868 he was appointed pension-agent, and later edited the *New York Monthly,* a German-American publication, and was the author of various essays on military subjects.

SIGERSON, George, Irish poet, physician, botanist and educator: b. Holy Hill, County Tyrone, about 1839; d. 17 Feb. 1925. He was educated at Queen's College, Cork, and later studied in Dublin and Paris. He was professor of botany at the Catholic University, Dublin, and was afterward professor of zoology at University College, Dublin. He exercised a profound influence over the Celtic revival, was an authority on Irish literature and history and wrote ably on Irish land tenure, political prisoners and kindred subjects for the *Irishman,* the *Nation* (Dublin) and the *Harp.* He performed a notable service to Irish letters in his translation of Celtic poetry, 'The Poets and Poetry of Munster' (1860) and 'Bards of Gael and Gall' (1897; 2nd ed., 1907). His own

verse is well known and is included in the modern Irish anthologies.

SIGHING, an act of respiration beginning in an involuntary, often sudden, sometimes prolonged inspiration, in which the diaphragm descends; the expiratory act which follows, and which constitutes the "sigh," being caused by the recoil of the chest-walls and lungs and by the action of the abdominal muscles. Sighing usually illustrates simple respiration as modified by mental or emotional conditions or by some factor of sensation. During strained attention, as when listening to a thrilling speaker, or witnessing an exciting scene, the respirations become very short and quickly recurring, with an occasional long sighing inspiration at intervals.

SIGHT. See Eye; Senses; Vision.

SIGHT, Defects of. See Vision, Defects of.

SIGILLARIA, sĭj-ĭ-lā′rĭ-a, a genus of fossil plants found in great abundance in the coal measures. The plant occurs in the form of compressed stems attaining a height of 40 to 50 feet, and a breadth of five feet. The stem is seldom found preserved so as to show any structure or even its cylindrical form; it generally occurs as a double layer of coal, showing on the outer surfaces longitudinal furrows due to the arrangement of the leaves on the stem, and at regular intervals the scars produced by the bases of the leaf-stalks. The roots are found preserved in the shale which forms the floor of all coal seams; they were originally supposed to be distinct plants, and have received the generic name of *Stigmaria*. No foliage of any kind has been found connected with the trunk. Some suppose Sigillarias to be allied to tree-ferns, others to *Coniferæ*. King says that if in imagination we delineate a channeled stem of any height between 12 and 100 feet, crowned with a pendant fern-like foliage, furnished with wide-spreading fibrilled roots, and growing in some densely-wooded swamp of an ancient Mississippi, we will then have formed a tolerably close restoration of a sigillaria growing in its true habitat.

SIGISMUND, sĭj′ĭs-mŭnd (Ger. zē′gĭs-moont), emperor of Germany, son of Charles IV: b. 14 Feb. 1368; d. Znaim, Moravia, 9 Dec. 1437. He succeeded to the margraviate of Brandenburg on the death of his father, Emperor Charles IV, in 1378, while his brother Wenceslaus, king of Bohemia, succeeded to the throne. By his marriage to Mary, heir of Louis the Great, king of Poland and Hungary, he became heir-apparent to the throne of these two countries, but on the death of Louis in 1383 the Poles chose Hedwig, Louis' younger daughter, for their queen, and the regency of the Hungarian throne was seized by Charles Durazzo, while Mary was kept in captivity. Sigismund rescued her and on the murder of Durazzo was crowned king of Hungary in 1387. His war against the Turks, though supported by the French and German chivalry, resulted in a disastrous defeat at Nicopolis in 1396, and Sigismund was compelled to escape into Greece. On his return to Hungary in 1401 he found his queen dead, his throne occupied by Ladislaus of Naples and his brother Wenceslaus maintaining with difficulty his throne in Bohemia, having been deposed in Germany. He was imprisoned by Ladislaus, but escaped, raised a large force and in 1403 succeeded in expelling Ladislaus and subduing the kingdom. In 1411 he was elected emperor of Germany and was crowned Holy Roman emperor at Aix-la-Chapelle in 1414. During the Council of Constance in 1414 he allowed John Huss to be put to death for heresy, an act which resulted in the Hussite War. Wenceslaus died in 1419, but it was not until 1431, when Sigismund signed the compact with the Council of Basel, that the Hussites would permit the acknowledgment of his succession to the Bohemian throne. He was crowned emperor in Milan in 1431, and his coronation was repeated in Rome in 1433. The Luxemburg dynasty became extinct at his death, as he was succeeded by his son-in-law, Albert II of Saxony. Consult Aschbach, J. G., 'Geschichte Kaiser Siegmunds' (4 vols. Hamburg 1845); Main, A., 'The Emperor Sigismund' (London 1903); Schiff, Otto, 'Kaiser Sigmunds italienische Politik' (Frankfort 1910); Windecke, E., 'Denkwürdigkeiten zur Geschichte des zeitalten Kaiser Sigmund's' (Berlin 1893).

SIGISMUND I, surnamed The Great, king of Poland: b. 1 Jan. 1467; d. Cracow, 1 April 1538. He was the youngest son of King Casimir IV, and in 1506 succeeded his brother Alexander on the throne of Poland. The war with the Russians, which was urged forward by the Lithuanian prince Michael Glinski, gave him employment throughout his whole reign. The peace of Poland was also disturbed by inroads of the Tartars and of the Wallachians. On the other hand Poland was increased by the addition of Masovia. By his toleration the Reformation spread in Poland, and Protestantism became the prevailing religion both in Grand Poland and Polish Prussia. Sigismund, after the death of his wife, Barbara Zapolika, married a daughter of the waywode of Transylvania and Bona Sforza of Milan. This marriage was the cause of many misfortunes to the country. The Italian soon secured for herself an influence in the government, sold the public offices and at last placed Piotr Kmita at the head of the administration, which acts contributed to destroy the popularity of the king. Under Sigismund the golden age of ancient Polish literature began.

SIGISMUND II, Augustus, king of Poland: b. 1 Aug. 1520; d. Knyszyn, 14 July 1572. He was son of Sigismund I, and was appointed king in 1529, in the lifetime of his father, and in 1544 obtained the government of Lithuania. His mother, Bona Sforza, allowed him to grow up in luxury and effeminacy that she might be able to continue her influence during the government of her son; but upon his accession he disappointed her expectations. When by the revival of ancient laws he proceeded firmly in curtailing the powers of the nobility they endeavored unsuccessfully to depose him. Bona, universally hated, finally quitted Poland with immense treasures for Italy, where she was poisoned by her paramour in 1557. Under Sigismund the Reformation made great progress in Poland, and many senators, landed proprietors, bishops and clergy exchanged the Roman Catholic faith for Protestantism. In 1563 Sigismund gave toleration to the different

religious parties, and in 1572, at the Diet of Warsaw, proclaimed universal religious freedom. With his death the Jagellon race became extinct. See POLAND.

SIGISMUND III, or **SIGISMUND VASA,** king of Poland and Sweden: b. 1566; d. Warsaw, 1632. He was the only son of John III, king of Sweden, and of the Polish princess Catharina, a sister of Augustus Sigismund II. After the death of Stephen Bathori he was invited, in 1587, to become king of Poland, and having sworn the Pacta Conventa was crowned at Cracow. He was a very zealous Catholic, and his principal aim was the extension of the Roman Catholic faith in Poland. On the death of his father, John III, in 1592, he set out for Sweden to take possession of the throne to which he had succeeded, and was crowned in 1594. On his return to Poland he was obliged to leave Sweden under the regency of his uncle who ultimately reigned over it as Charles IX. Sigismund's refusal to give up the Swedish crown, of which he became deprived, involved Poland in a disastrous war with Sweden, which lasted for 60 years. Consult Niemojewski, S., 'Mémoires' (Lemberg 1899); Niemcewicz, J. U., 'History of the Reign of Sigismund III' (Breslau 1836); 'Sveriges Historia' (Vol. III, Stockholm 1881); Rembowski, A., 'The Insurrection of Zebrzydowski' (Cracow 1893).

SIGL, zē'gl, **Georg,** mechanical inventor: b. Breitenfürth, Lower Austria, 1811; d. Vienna, 9 May 1887. He was in youth apprenticed to a locksmith and practised his trade in Bavaria, Württemberg and Switzerland. In 1832 he took employment in the rapid printing press factory of Helwig and Müller, and in 1837 introduced the manufacture of rapid printing presses into the hand press factory of Dingler in Zweibrück, and opened a branch factory of the same sort in Vienna, where he constructed the first rapid lithographic press (1851). Later he manufactured rotary presses, and applied himself to improving the locomotive and other machinery.

SIGMA XI (*Σπουδῶν Ξυνωνες*, "companions in zealous research"), a college honorary society for scientific students, founded at Cornell University in 1886 and now possessing chapters in 30 colleges and schools. It provides for scientific students a society similar to that of Phi Beta Kappa in literature. Its object is to provide meetings for the discussion of the work of its members, promotion of a fraternal feeling among them, the encouragement of original research in pure and applied science and to aid scientific progress by the publication of material dealing with its development and achievements. The membership includes resident professors and instructors, graduates and, in limited numbers, undergraduates who evidence unusual promise. Honorary membership is accorded scientists who have achieved important work in either pure or applied science. The badge or insignia is a gold watch pendant in the form of a monogram of the two letters of the Society. Annual conventions are held, each chapter sending three delegates who meet with the council of the Society. The Society was at first averse to extending its organization, but there are now 30 chapters, of which that at Yale University was established in 1895 and that at Columbia in 1915. The combined membership of the Society is about 10,000, of whom about 2,300 are active members. Since March 1913 the Society has published the *Sigma Xi Quarterly.* Consult Ward, H. B., 'Sigma Xi Quarter Century Record and History, 1886–1911' (1911).

SIGN LANGUAGES are vehicles of communication by gestures, principally employed by primitive peoples, such as the American Indians. They are of two kinds, the descriptive and the characteristic or indicative signs. Descriptive signs involve an account, more or less complete, of the appearance, qualities and uses of an object, or the circumstances of an event, for the purpose of description or explanation; and must, from their nature, be varied, like a painting, only by the point of view from which the objects are described, or the capacity and accuracy of the person that describes. The indicative signs, on the contrary, which are employed in common conversation, are usually mere abbreviations of these, involving a single striking feature of the person, or object, or event; as an elephant is indicated by its trunk, a flower by its fragrance or a town by a collection of roofs. The signs of persons are usually conventional, and derived from some feature, or mark, or habit but often from an accidental circumstance in dress, etc., which struck the deaf-mute on first seeing the person and is still referred to when it no longer exists. This form of expression, as developed in certain institutions for deaf-mutes, is of a character which those who value it least admit to surpass speech in the force with which it communicates the feelings and states of mind. Like painting (as Condillac observes) it has the immense advantage of presenting a group of ideas at once, which lose much of their force and beauty by being detailed in the successive words and artificial arrangements of written language. The eye, the hand, the whole body, speak simultaneously on one subject; the representation changes every moment, and these peculiarities, with the elliptical form of expression which is adopted in conversation, give a rapidity to communication by the sign language which, on common subjects among those familiar with it, surpasses that of speech. If we remark the new shades of meaning given to the same words by the varying attitude and general expression of the speaker, and the accuracy with which a nice observer will discover, in these signs, the thoughts, and feelings, and intentions, even of one who wishes to conceal them, we shall find reason to believe that they are capable of conveying the most delicate shades of thought. Generic and abstract terms, as their objects do not exist in nature, have no corresponding terms of equal clearness in the sign language; and the abbreviated manner in which we express relations by conjunctions, prepositions, relatives and inflections, can only be imitated by adopting similar conventional signs, which do not easily fall in with the idiom of the language. In these respects, therefore, the sign language lacks the algebraic brevity and accuracy which are found in artificial languages, and which render these so invaluable as mediums of thought and instruments of philosophical investigation; at

the same time it is capable of describing what is conveyed by these forms, with an accuracy at least as great as that of words by circumlocution and example. It is worthy of remark that the order of expression in the sign language is that which we term inverted—the subject before the quality, the object before the action and, generally, the thing modified before the modifier. This language, in its elements, is to be found among all nations and has ever been the medium of communication between voyagers and the natives of newly-discovered countries. It is employed by many savage tribes to supply the paucity of expression in their language, or to communicate with other tribes, as has been observed among the Indians of North America. It is known that among the Indians of the western regions of the United States there was an organized language employed between tribes who spoke different articulate languages. See also GESTURE.

SIGNAL CORPS, United States. See ARMY, DEPARTMENT OF THE—*Administrative and Technical Services.*

SIGNALS, Railway. See BLOCK AND OTHER RAILWAY SIGNAL SYSTEMS.

SIGNALS AND SIGNALING. The word "signal" is defined in the dictionary as "a gesture, act, light, etc., serving to warn, direct, command or the like." It also connotes ways of communicating information according to prearranged systems or codes. In addition signaling implies that the use of spoken or written words is impracticable, disadvantageous or too slow. Technically speaking such methods of communication as the land telegraph, the telephone, the teletype, and other similar devices fall in the domain of signaling but are not so considered in common parlance. Radio telegraphy is however more likely to be thought of as signaling because it is one of the two important methods of making use of the International Code of signals.

Signaling goes back to remotest antiquity and is described in the earliest historical writings. Means for transmitting information rapidly to a distance have been developed by even the most primitive people. The American Indians, especially those west of the Mississippi River, were adept in the use of smoke signals. Sound signals made by beating drums are still used in tropical regions where dense vegetation interferes with the use of visual signals. The uncanny passage of news through the jungles of Africa by this method is an example.

Marine Signals.—Modern signaling has its roots in the communication needs of mariners. That the most ingenious signaling devices and the most elaborate signal codes are those used by mariners is not a matter of chance but of necessity. Normally ships at sea have no way of communicating with one another or with the shore except through the medium of signals. Visual, sound, and radio signals are as effective in bridging distance at sea as they are on land, but the mariner needs something more. He needs in addition a code to overcome the barrier of language that more often than not lies between him and those with whom he wishes to communicate. To this end and to secure other advantages associated with signaling an International Code of Signals has been adopted by the maritime nations of the world.

Organized signaling between naval ships as distinguished from merchant ships goes back several centuries but until the end of the 18th century the things that the admiral of a British fleet, for example, could say by signals to the ships under his command were few and there were no codes or signal books to facilitate and to speed up the process. Beginning with the early part of the 19th century codes of signals for the use of mariners in general, but intended especially for merchant ships, were published in various countries. Some of these were brought out by private enterprise. The code most used by American vessels at the height of the clipper ship era was one published in 1854 by Henry J. Rogers of Baltimore, Maryland. The first so-called International Code was drafted in 1855 by a committee set up by the British Board of Trade. It was published in book form in 1857. The book was adopted by most of the maritime nations and lasted for over 30 years when a revision was undertaken which was put into effect in 1897. This edition was given a very severe test during World War I because ships of all nations came into frequent contact with one another and had constantly to exchange messages relating to examination, mine fields, patrolling, and keeping position in convoys. Neither the code nor the instructions for its use stood the test as the system was not truly international. After World War I the British government proposed that the revision of the International Code be considered by the International Radiotelegraph Conference due to be held in Washington in 1927. This was done and a revised code was brought out in 1931. This revision fully met the requirements of World War II.

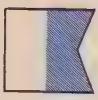
The *International Code of Signals* is contained in two volumes: Volume I—*Visual*, and Volume II—*Radio*. The principal methods of visual signaling are by flags, flashing lights and semaphore. The color plate which is part of this article shows the 26 International Code alphabet flags, 10 numeral pennants, 3 repeater pennants, and the code pennant used in making signals by the flag method. The flags are hoisted singly, or in combinations of two, three, or four alphabet flags but never more than four alphabet flags in a single group. The flags are seldom used to spell out words but practically always to convey the meaning assigned to the various combinations given in Volume I of the code book.

Single letters are used for messages that are either very urgent or are sent very frequently. The following are the single letter signals of the International Code:

A I am undergoing a speed trial
B I am taking in or discharging explosives
C Yes (affirmative)
D Keep clear of me, I am maneuvering with difficulty
E I am directing my course to starboard
F I am disabled. Communicate with me
G I require a pilot
H I have a pilot on board
I I am directing my course to port
J I am going to send a message by semaphore
K You should stop your vessel instantly
L You should stop. I have something important to communicate
M I have a doctor on board
N No (negative)

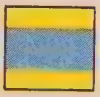
SIGNALS AND SIGNALING

ALPHABET FLAGS


A .—

B —...

C —.—.


D —..

E .

F ..—.

G — —.

H ....

I ..

J .— — —

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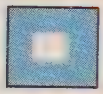
M — —

N —.

O — — —


P .— —.

Q — — .—

R .—.

S ...

T —

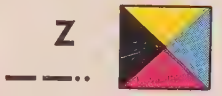
U ..—

V ...—

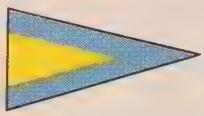
W .— —

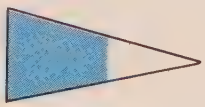
X —..—

Y —.— —


Z — —..

REPEATERS


1st Repeat


2nd Repeat

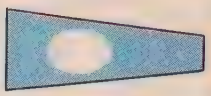
3rd Repeat

CODE or Answering Pennant

NUMERAL PENNANTS

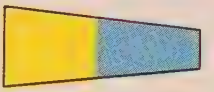
1 .— — — —

2 ..— — —

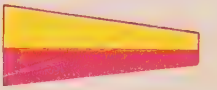

3 ...— —

4 ....—

5 .....

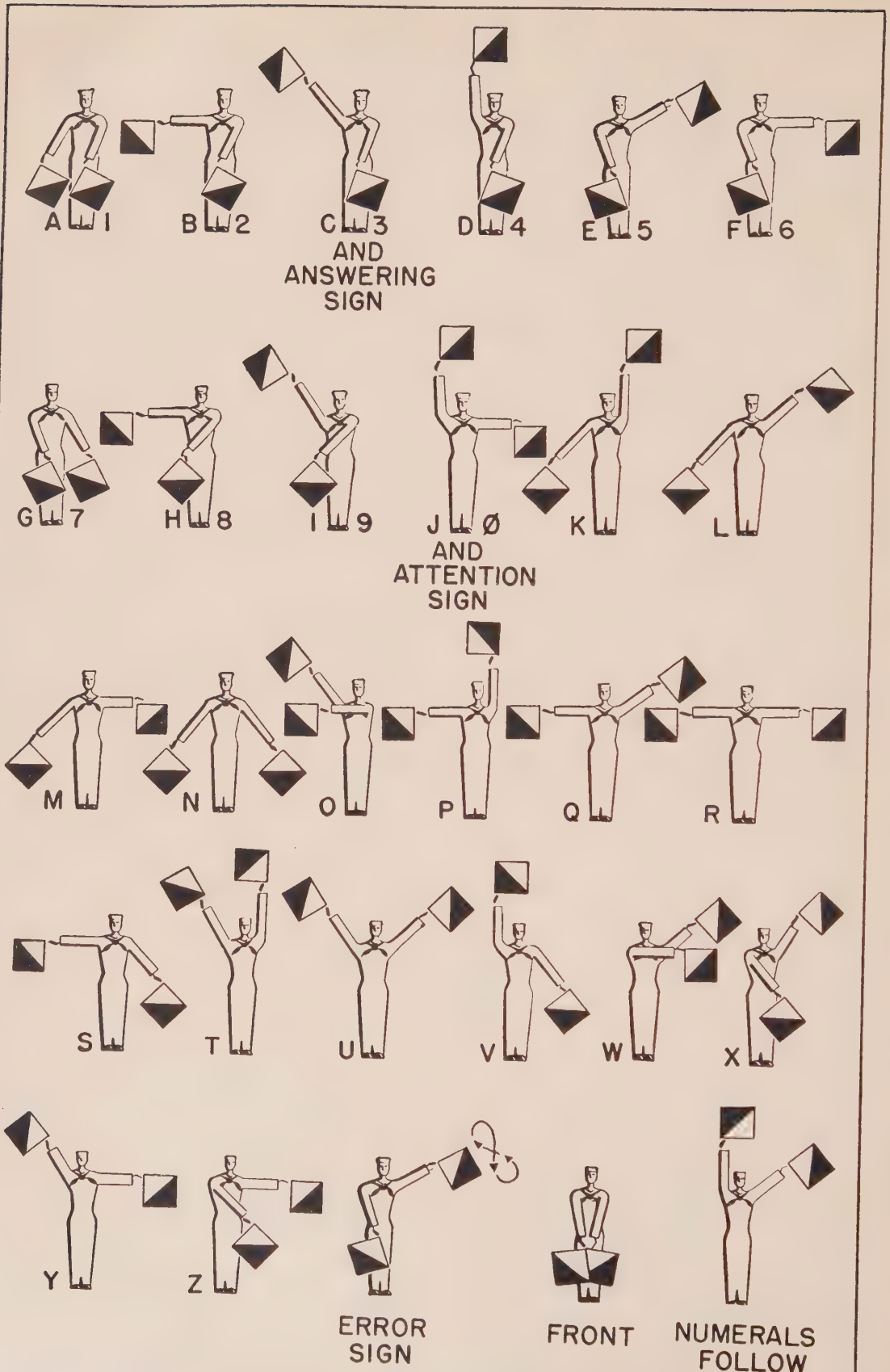

6 —....

7 — —...


8 — — —..

9 — — — —.

0 — — — —



Adapted from "The Bluejacket's Manual," U. S. Naval Institute

Semaphore alphabet, numbers, and special signals.

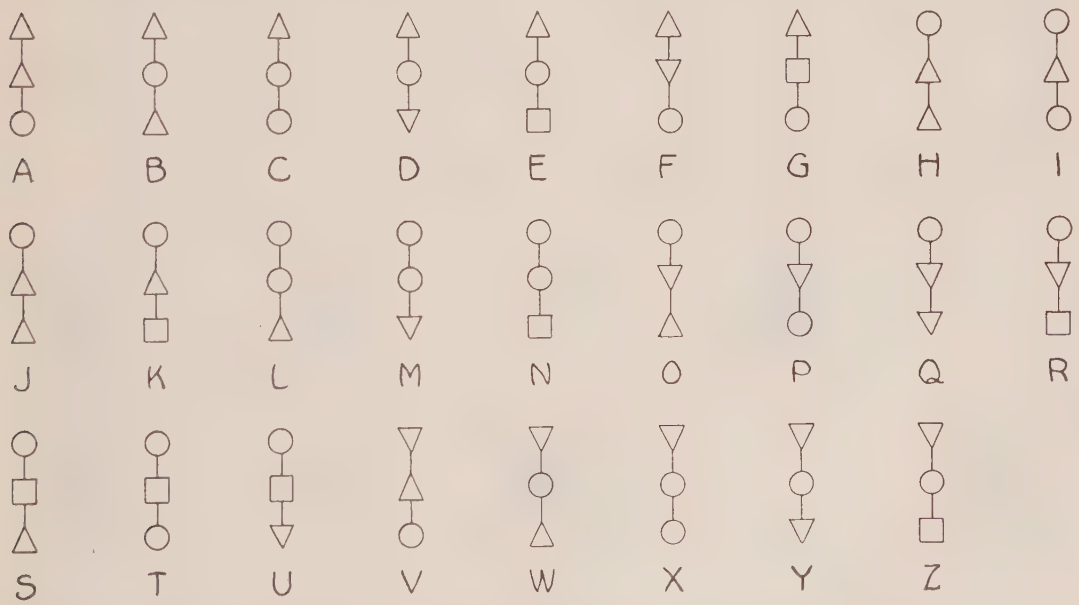
O Man overboard
P In harbor (Blue Peter). All persons are to repair on board as the vessel is about to proceed to sea. (Hoisted at the foremast head.) At sea—your lights are out, or burning badly
Q My vessel is healthy and I request free pratique
R The way is off my ship; you may feel your way past me
S My engines are going full speed astern
T Do not pass ahead of me
U You are standing into danger
V I require assistance
W I require medical assistance
X Stop carrying out your intentions and watch my signals
Y I am carrying mails
Z Used to address or call shore stations

A special code of single letter towing signals is also provided, some of which are the same as the above.

Two letter signals have been assigned to words, phrases or messages that follow next in importance. They consist mostly of distress and maneuvering signals with a few general signals of frequent use. Three letter signals are used for all other words, phrases and sentences not covered by one and two letter signals. Four letter signals, having "A" as the first letter, are used to designate the geographical places listed under the "Geographical Section" of Volume I of the *International Code of Signals.*

easy, but it was obviously impossible to anticipate all of the sentences and phrases that might be needed in actual practice. The single letter and two letter signals consist mostly of complete sentences. The three letter combinations consist of words and phrases so chosen that a message coded word for word in one language will be understood when decoded in any one of the others. One of the difficulties in compiling a multilingual code is that single words in one language often require several words in other languages to insure an adequate translation. Another difficulty is that such a code cannot take account of the difference in word arrangement to form sentences that exist between some of the languages and English. To meet these and other problems, many ships carry on board the English edition of the code as well as the edition in their own language.

For flag signaling the United States Navy uses the International alphabet flags and numeral pennants, and in addition has a set of numeral flags and special meaning flags of its own. Flag hoist signaling provides for the navy a rapid and accurate method of making tactical and informational signals of reasonable length. In general signals so made insure more uniform execution of maneuvers than if made by any other method. The limitations of the method are that it can be used only in the daytime and in clear weather. The United States Navy has its own signal books but the International Code is also always on hand for communicating with other than United States naval vessels.



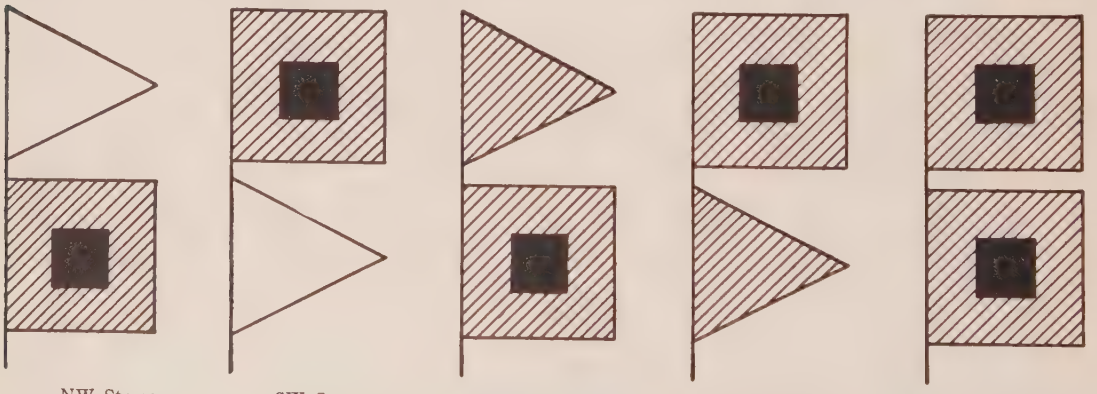
The International Code of signaling by cones, balls and drums, illustrated above, is now obsolete and is shown here only for its historical interest. The use of this system of distant signals was officially abandoned in 1930 by the International Radio Telegraph Conference held in Washington, D.C.

In order to facilitate the use of the code internationally, editions have been brought out in English, French, German, Italian, Japanese, Spanish, and Norwegian. English was used as the basic language in compiling the code and in writing the instructions for its use. Had it been possible to prepare a code consisting of complete sentences only, the problem of compilation in seven languages would have been comparatively

Storm Warnings.—The United States Weather Bureau displays flags as shown in the accompanying cuts (shading indicates red) to announce the approach of storms. A red pennant displayed alone indicates that while the winds may not reach a velocity sufficiently high to justify display of a regular storm warning, they will interfere with the safe operation of small craft, such as those engaged in fishing, towing, motor

boating, and yachting. A red flag with black center indicates that a storm of marked violence is expected. A pennant, either red or white, displayed with such a flag, arranged as shown in the illustration, indicates the direction from which the wind is expected to blow. A hurricane is announced by two red flags with black centers, one above the other. The hurricane warning at night consists of two red lights placed vertically with a white light between.

Flashing Light Signals.—The International Morse Alphabet is used for transmitting signals by flashing light, sound, and radio. In this code each letter and number is represented by a particular combination of dots and dashes. Taking the dot as a unit, a dash is equivalent to three units and the pause between two elements of a letter is equivalent to one unit. The mechanism for making flashing light signals is either an electric light which is turned off and on or of a steadily burning light which is alternately obscured and exposed by a shutter. The shutter method is used with searchlights and is suited to daylight as well as night signaling. The longest range visual signaling in daylight is in fact done with large searchlights. The make and break method is used with the various electric light systems such as the yard arm blinker, the hand flashlight and the blinker tube. The last mentioned is simply a light encased in a tube closed at one end. The tube is pointed in the direction of the receiver of the message and the light is turned off and on by a trigger operated switch. The blinker tube method is the least conspicuous of the flashing light systems and is especially adapted to darkened ship signaling, but its range is limited. Signaling by infra-red radiation, invisible to the naked eye, was developed during World War II. The signals are viewed through a receiver which converts the infra-red waves into visible light waves. The range of an infra-red source is reduced by adverse weather conditions to approximately the same degree as the range of white light of comparable intensity.



NW Storm SW Storm NE Storm SE Storm Hurricane

Semaphore.—In this system the letters of the alphabet and the numerals are represented by the position with respect to each other of the two arms as shown in the accompanying illustration. The alphabet so made is sometimes referred to as the changing angle alphabet. Mechanically operated arms mounted on towers for land signaling and on the bridge of ships for marine signaling were at one time in general use but the present practice is for the signalman to hold a flag in each hand and to form the angles representing the letters with the extended arms. Semaphore using the arms is a rapid method of signaling over short distances, speeds as high as 25 words per minute being readily attainable. In the United States Navy it is used at sea largely for messages between ships in formation. In port it is used, so far as distance permits, for all daytime administrative signaling between ships.

Rule of the Road Signals.—The most frequently used and universally understood signals are probably those connected with the observance of the so-called Rule of the Road at Sea. Their purpose is to prevent collisions and to provide a simple code for giving notice that a vessel is in distress. Masthead lights are prescribed as to kind and location to show whether vessels are underway and to give warning of limited maneuverability because of the work in which they may be engaged, such as fishing, dredging, towing, etc. Side lights are used to show which way the vessel is heading. Sound signals are prescribed for vessels in a fog, and for indicating their intention as to course in passing; also to give notice when the engines are backing. Distress signals consist of firing a gun or other explosive at short intervals, repeating the letters SOS by radio, displaying appropriate International Code signal flags, and sounding continuously any fog signal apparatus. At night in addition to the sound and radio signals, flares and rockets may be used.

Submarine Signals.—Sound signals can be produced, transmitted, and received underwater as they can in the air. The sound impulses are created in the water by an electrically driven oscillator mounted in the skin of the ship and are picked up on the receiving ship by a microphone installed in a tank having the hull plating of the ship for one of its sides. Thence the signals are transmitted to a head set worn by the operator or to electronic receiving and recording devices. This method is used to some extent for Morse alphabet communication between ships, particularly between submarines. The most important uses of underwater sound signals are however for detecting and tracking submarines and in the form of the fathometer for determining the depth of water. For these purposes the echo of the sound signal is used. The elapsed time between the sending of the impulse and the return of the echo from the bottom or from a submerged object such as a submarine is measured and converted automatically by the instrument into distance units which show up as illuminated figures

on a dial or recording device. In recent years under water sound signals have found extensive use in commercial fishing craft for locating schools of fish and shrimp colonies. The range of under water sound signaling does not normally exceed 3,500 yards and this is often considerably reduced by temperature and density gradients in the ambient water. However, under exceptionally favorable conditions much greater ranges are sometimes achieved.

Radiotelegraphy.—Limited range is the principle shortcoming of all of the foregoing signaling methods. Once at sea and over the horizon ships equipped only for visual and sound signaling remain out of touch with the world until they fall in with other ships or reach their destinations. The invention and development of radio telegraphy at the turn of the last century put an end to this limitation and brought about profound changes in the management of sea borne commerce, in the control by governments of their naval and distant military forces and in the safety of ships at sea.

We are here concerned only with radio as a signaling device. For this purpose it uses the Morse international alphabet code. There are many aspects of radio telegraphy which from the beginning required international agreement in order to avoid chaos in its use, and to stimulate its further development. One of these was the need for agreeing on an international code to parallel the code already adopted for visual and sound signaling. The radio code now in use after some earlier versions is the outcome of deliberations of the International Radiotelegraph Conference held in Washington in 1927. As mentioned above the visual code was also revised at this conference.

Although a large percentage of all radio traffic goes by Morse alphabet in plain language (much of it in English no matter what the language of the communicators), there are definite advantages in using a code especially a code that has seven different language editions so worked out that concise and unequivocal messages can be exchanged between persons who do not know the same language. The radio code was devised particularly to meet the needs of aviation because visual and sound signals can be used by aircraft to only a very limited extent. The radio telephone has largely displaced radiotelegraphy for short range aircraft communication, just as it has taken the place of submarine cable communication for many purposes. The telephone whether employing radio transmission or metallic circuits can hardly be called a signaling device as conversation is carried on directly and usually in plain language without the interposition of codes or the need for translation. The provision for scrambling radio telephone speech does however give it one of the characteristics of a signaling method in that this provision protects the user against eavesdropping.

There are numerous other applications of electronics to signaling which need only be mentioned here as they are covered in greater detail in articles on the subjects to be found elsewhere in these volumes. Time signals are broadcast at regular intervals from powerful radio stations as aids to air and sea navigation. Continuous signals are sent out by radio beacons to keep aircraft on their courses overland. Signaling systems at air fields assist aircraft in making blind landings. Radio compass bearings are transmitted to ships from stations along important coast lines. The Loran system of navigation is based on signals sent continuously from specially equipped shore stations which when picked up by appropriate receiving devices on ships or aircraft fix their geographical positions. Radar makes use of a rather narrow band of electromagnetic wave lengths which have the property of being reflected by solid objects. Such echo signals have been put to a great variety of uses.

Signaling in Land Warfare.—Until the invention and development of Morse's electromagnetic telegraph during the decade ending in about 1848 the use of signaling in land warfare had received little attention. Some use had been made of smoke beacons and semaphore and the heliograph but the galloping aide was the conventional method of transmitting orders and information to troops beyond the range of bugles, drums and the human voice. Forward looking military men recognized in the telegraph the means for controlling from distant headquarters the movements of armies and of their logistic support and of obtaining information from the front quickly. It was obvious that thereby a degree of coordination and timing could be brought about never found possible before. Three major wars in the decade and a half following Morse's invention, the Crimean War 1854–1856, the American Civil War 1861–1865, and the Prussian Campaign against Austria in 1866, provided testing laboratories for the further improvement of the telegraph and its collateral equipment for field use. All countries found it necessary to train special personnel for this service. In the case of the United States a Signal Corps was established coequal with the other specialized corps of the army. It is interesting that the first army aviators were Signal Corps officers and that army aviation came under the Signal Corps until a separate Air Corps was established. The significance of this is that in the early days of military aviation including the first months of World War I the airplane was looked upon as primarily an instrument of reconnaissance; the pilot making his report after returning from a mission. Shortly however spotting and reporting the fall of shot for the artillery was added. This led to the installation of radio in aircraft. Often also the need arose for isolated bodies of ground troops to make known their predicament and their position. This could be accomplished most easily by displaying coded ground signals to their own aircraft. The airplane thus became an important link in the signaling and communication systems of ground forces before it developed into a powerful weapon of offense and defense.

Radio Telephone.—The radio telephone to a great extent has taken the place of code signaling in ground and air warfare. When this instrument first appeared in the offing the armed services did everything possible to speed its development as it obviously was the answer to most of the shortcomings of other signaling and communication methods. Actually it is an extension of the senses of sight, hearing, and speech rather than a signaling method. It is however not altogether proof against the eavesdropper. But when used in conjunction with the motorcycle, radar, and the reconnaissance airplane, the radio telephone is capable of providing headquarters directing military operations with more complete information and at greater speed than was possible by former signaling methods.

Miscellaneous Signals.—Some other uses of signals are the very elaborate systems devised by the railroads for controlling traffic in terminals, and freight yards and the block systems for safeguarding trains against collision. In many small cities the location of fires is announced by whistle or other sound signals. Warnings of impending air attacks are given in the same way. The great development in the field of electronics brought about by World War II has vastly extended the use of signals in industry and transportation. See also LIFE SAVING SERVICE, THE UNITED STATES; BLOCK AND OTHER RAILWAY SIGNAL SYSTEMS; LORAN; RADAR.

J. A. FURER,
Rear Admiral, United States Navy (Retired).

SIGNET, in England, one of the royal seals, used in sealing private letters and all such grants as pass the sovereign's hand by bill signed.

SIGNORELLI, sē-nyô-rĕl'lē, **Luca** (in full LUCA D'EGIDIO DI VENTURA DE'; also called LUCA DA CORTONA), Italian painter: b. Cortona, 1441; d. Arezzo, 1523. He began to distinguish himself about 1472, and painted until 1512, or perhaps later. He holds an important place in the history of art as the first who applied anatomical knowledge to painting, and thus became the precursor of Michelangelo. Signorelli's greatest works are the magnificent frescoes in the Chapel of the Madonna di San Brizio in the Cathedral of Orvieto. The series comprises the *History of Antichrist,* the *Resurrection of the Dead, Hell* and *Paradise.* It was begun by Fra Angelico about 1447, and finished by Signorelli between 1499 and 1504. These frescoes were studied by Canova, and by Michelangelo, who did not disdain to copy some of the figures for his *Last Judgment.* Among his other works the most worthy of mention are the *Madonna Enthroned,* the altarpiece of St. Onofrio in the Cathedral of Perugia; the *Adoration of the Magi,* now in the Louvre; the *Annunciation,* and a *Madonna,* at Volterra. Signorelli was a man of high character and attained municipal as well as artistic honors.

SIGNS AND SIGNBOARDS. The art of sign painting was known among the Greeks and Romans and specimens of ancient signs have been found at Pompeii and Herculaneum, sometimes painted, but more often carved. A bush was the sign of many taverns as late as the reign of James I. During the Middle Ages every trade had its emblem, some of which have survived, as the chemist's pestle and mortar, the pawnbroker's three balls and the barber's pole. Besides these trade emblems, every individual trader might have his own special device: Southey's father, a Bristol linen-draper, for his chose a hare. During the 16th and 17th centimes painted, but more often carved. A bush was They were suspended either from projecting metal work from a post or an obelisk, or from a sort of miniature triumphal archway, and sometimes cost great sums. These creaking and ponderous signboards proved a source of annoyance, sometimes of positive danger, as when in 1718 one in Fleet Street, London, dragged down a house front and killed in its fall four persons. So in 1762–1770, under act of Parliament, the London signboards were either wholly removed or at least affixed to the fronts of the houses; and this example was gradually followed throughout the kingdom, though here and there signposts linger or have been restored, even in London. One of the oldest and most interesting signs still existing is the "Red Lion" at Martlesham, Suffolk, England, for it was the figurehead of one of the Dutch fleet defeated off Southwold in 1672; but the history even of vanished signboards has no slight interest. A good many signboards have been painted by great artists, Holbein, Correggio, Paul Potter, Hogarth, Wilson, Morland, David Cox, "Old" Crome, Sam Bough and Sir J. E. Millais (some of which are still extant). In the United States many old and picturesque signs are still to be found in Eastern cities, particularly in Atlantic coast towns. Modern signs are made mostly of metal and are illuminated. Elaborate signboards indicating the trade practiced by the owner were necessary in an age when very few could read. With the spread of education among the masses they have become unnecessary. Lettered announcements now suffice to call attention to the wares within.

SIGONIO, sē-gô'nyô, **Carlo** (Lat. CAROLUS SIGONIUS), Italian humanist: b. Modena, c.1524; d. near Modena, August 1584. After studying at Pavia and Bologna he was elected professor of Greek at Modena in 1545. Accepting a professorship at Venice in 1552, he exchanged it for the chair of eloquence at Padua in 1560. His treatise *De nominibus Romanorum,* in which he corrected errors in a similar work by Robertelli, a colleague, initiated a violent dispute between them and influenced his acceptance of a call to Bologna in 1563. The publication at Venice in 1583 of a work, allegedly Cicero's *Consolatio,* written to dull his grief over the death of his daughter Tullia, occasioned a final violent dispute. Sigonio argued that, if not genuine, it was at least worthy of Cicero; his adversaries ridiculed the idea and accused him of having written it himself as a hoax. The forger is unknown.

SIGOURNEY, sĭg'ĕr-nĭ, **Lydia Howard Huntley,** American author: b. Norwich, Conn., Sept. 1, 1791; d. Hartford, Conn., June 10, 1865. She received a good education, showed considerable facility in rhyme at an early age and many of her pieces were published in the periodicals of the day. For some time before her marriage to Charles Sigourney in 1819, she had been engaged in teaching in schools for young ladies. In 1815 she published *Moral Pieces in Prose and Verse,* which was quickly followed by other works, most of which enjoyed great popularity. Among her principal poems are *Traits of the Aborigines of America* (1822); *Pocahontas* (1841); *Scenes in My Native Land* (1844); *Voice of Flowers* (1845). Her prose works are mainly biographical, historical, didactic, and epistolary.

In 1840 she visited Europe, and in 1842 gave some reminiscences of the tour in a volume entitled *Pleasant Memories of Pleasant Lands.* She has been called the "American Hemans," and certainly rivals her English prototype in copiousness, having, by her own computation, written 46 works (in whole or in part), and more than 2,000 contributions to about 300 periodicals.

SIGSBEE, Charles Dwight, American naval officer: b. Albany, N. Y., Jan. 16, 1845; d. July 19, 1923. Appointed to the United States Naval Academy in 1859; was graduated in

1863, was made ensign in that year and for his first two years of service was attached to the *Monongahela* and the *Brooklyn* of the West Gulf squadron. He took part in the bombardments of, and attack on, Fort Fisher, and in the battle of Mobile Bay. In 1868 he attained the grade of lieutenant-commander. Thereafter he was employed in various duties, being at different times with the Asiatic and North Atlantic squadrons; stationed at the Naval Academy 1869–70; in the hydrographic office (1873–74); and commander of the coast-survey steamer *Blake* employed in deep-sea exploration for the government. The chief portion of the outfit of the *Blake* consisted of inventions or adaptations by Sigsbee, and in recognition of these he received a gold medal at the London International Fisheries Exhibition and the decoration of the Red Eagle of Prussia from Emperor William I. Promoted commander in 1882, he was successively on duty at the academy (1882–85); commander of the practice-ship *Dale* (1883–84), and of the *Kearsarge* on the European station (1885–86); and on shore duty (1887–90). In 1890–92 he commanded the training-ship *Portsmouth*, in 1893 was made chief of the hydrographic office, was made captain 21 March 1897 and on 10 April subsequent assigned to the command of the *Maine*. The *Maine* was designed at the Navy Department, built at the New York navy yard, commissioned 17 Sept. 1895 and the most powerful second-class battleship in the United States navy. In January 1898 the vessel was ordered to the port of Havana, Cuba, arriving there 25 January. There it was met by an official Spanish pilot and moored to a mooring-buoy chosen by him. At 9.40 o'clock on the evening of 15 February the *Maine* was destroyed by an explosion in which the entire forward part of the ship was utterly wrecked. Two officers and 264 of the crew perished. The United States court of inquiry appointed to inquire into the catastrophe found that the vessel was destroyed by the explosion of a submarine mine, and that no evidence was obtainable fixing the blame. A Spanish court making a simultaneous investigation reported that the disaster was caused by an internal explosion. It was very generally believed, however, in the United States that the loss of the ship was in some way due to Spanish initiative. Therefore, says Sigsbee in his own narrative, "although the war which followed was not founded on the destruction of the *Maine* as a political cause, that disaster was the pivotal event of the conflict." Sigsbee's wise dispatches at the time did much to suspend any popular demand for immediate reprisals, while his expert knowledge was of great value to the court of inquiry. He rendered distinguished service during the Spanish-American War as commander of the converted liner *Saint Paul*, with which on 24 May 1898 he captured the collier *Restormel*, securing Cervera's coal supply, and 22 June defeated the cruiser *Isabella II* and destroyer *Terror* off San Juan, Porto Rico. Subsequently he was ordered to command the *Texas*, in 1900–02 was chief officer of naval intelligence, in 1903 was made commander of the navy yard at League Island, Pa., and promoted rear-admiral. In 1904–05 he was commander of the South Atlantic squadron, and in 1905–06 of the second division of the North Atlantic fleet. He retired 16 Jan. 1907. He published 'Deep Sea Soundings and Dredging' (1880), and 'The *Maine*: An Account of Her Destruction in Havana Harbor' (1899).

SIGURD, zē'goord, or **SIGURDE**, a name famous in Scandinavian mythology. According to the legend Sigurd, the Siegfried of the Nibelungenlied, is the posthumous son of Sigmund, son of Volsung, a descendant of Odin; is born in the palace of Hialprek, king of Denmark, and grows up into splendid manhood. With his good sword Gram, which had once been wielded by Odin, he slays the dragon, Fafnir, and obtains the golden treasure which it guarded; by eating the monster's heart he is endowed with a wisdom which enables him to understand the songs of the birds. Riding off with his spoil he strikes through a lonely heath, in the midst of which is a volume of flame, surrounding a house in which a fair maiden Brenhyldr (Brunhild in the Nibelungenlied), daughter of Atli, lay asleep, never to be wakened until there came a hero brave enough to ride through the fierce flame. Sigurd enters and wakes up Brenhyldr, to whom he plights his troth, and then rides to the palace of Giuki the Niblung, who wishes Sigurd to marry his daughter Gudrun (Chriemhild). Gudrun's mother gives Sigurd a potion which causes him to forget Brenhyldr, and he marries Gudrun. Her brother Gunnar (Gunther), having determined to marry Brenhyldr, tries vainly to ride through the flames, and so his mother by her magic arts made Sigurd change shapes and arms with Gunnar, and so rescue Brenhyldr. On the bridal bed Sigurd places his sword between himself and Brenhyldr, and the following morning he resumes his shape, and hands her over to Gunnar. No sooner is this done than the power of the elixir passes off, and he sees when too late that he has betrayed his first love. After the lapse of years Brenhyldr is told that she was rescued from the flames by Sigurd and not by Gunnar, as she thought; and her love for the hero gives way to wrath and thoughts of vengeance. She urges Gunnar and his brothers to slay him, but as they had already taken an oath not to hurt him, they refuse. They, however, incite their half-brother to do the deed, and Sigurd is killed as he lay sleeping. The death of the hero revives all the love of Brenhyldr, and lying down by his side with the sword Gram between them, she dies broken-hearted on his funeral pile. Consult Boer, R. C., 'Untersuchungen über den Ursprung und die Enwicklung der Nibelungensage' (Halle 1906); Abeling, T., 'Nibelungenlied' (1907); Lichtenberger, H., 'Le poeme et le légende des Nibelungen' (Paris 1891); Paul, H., 'Grundriss der germanischen Philologie' (Vol. III, Strassburg 1900).

SIGURD SLEMBE, slĕm'bĕ', a trilogy by Björnstjerne Björnson, translated by W. M. Payne. This splendid sagadrama, so deeply impressive and so typically characteristic of Björnson, was planned by him already in 1858, when he was manager of the National Theatre in Bergen, but not completed until the author's stay in Rome in 1862. The author made a most thorough preparation for this work. Not only did he digest all that is to be found in the sagas about this unrecognized illegitimate son of Magnus Barefoot, king of Norway, but he

followed his hero in all his travels and adventures around in Europe in the early part of the 12th century. We find the whole spirit of the Middle Ages at the time of the Crusades in the very action, in the psychological exposition, and in the tragic solution. *Sigurd Slembe* is the tragedy of the man whose great gifts and talents qualified him for leadership, but of whom his own country would not make use—a theme which appealed to Björnson especially at the time when the drama was written. The ethical conflict is the same that the author treated in some of his earlier novels and his saga dramas. According to one of Björnson's letters, it is the conflict, in a man highly gifted by nature, between the craving for self-assertion and the duty to submit one's powers to the demands of a higher and nobler aim. In the first section of the trilogy, *Sigurd's First Flight,* the hero is presented to us, a powerful, handsome youth, full of energy and ambition. But he has no family name. In the opening scene he forces from his mother the confession of the name of his father. The poor woman at last reveals that King Magnus was her lover. At last he knows from what race he comes. He breaks away to seek adventures, to make a name and to return to claim the throne of Norway.

In *Sigurd's Second Flight* we find the hero on the coast of the old Norwegian colony Caithness, Scotland, at the court of the exiled Earl Harold of Orkney. This sickly young man has no ambition and asks no more than to be at rest among his dreams. But his life is tortured by the wranglings of his mother and her violent and intriguing sister. The two women seek the aid of the magnificent Norwegian who has arrived in their palace, nobody knows whence. An orphan niece, Audhild, one of Björnson's finest female creations, falls in love with Sigurd. The young man is eminently successful in his campaign against Orkney. The earl, however, commits suicide and Sigurd rejects the crown which now lies at his hand and passes out to sea again. He tears himself from the arms of Audhild in a scene of extraordinary beauty and passion.

Sigurd's Return is the closing play. King Harold Gille, Sigurd's half brother, is with his court in Bergen. Our hero returns with the same hopes and illusions as when he left. Again, fate is against him. Two of the scenes especially are among the finest ever written by Björnson—the scene between Sigurd and the Finn girl, and Sigurd's sublime soliloquy: "The Danes desert me! The battle is lost! Here and no further!"

Failure confronts him as the result of all his toil. All avenues of escape are closed upon him. As he stands face to face with the ruin of the edifice he so nearly succeeded in erecting, all events of his past life come before him. He sees life in its true aspect. All worldly hopes being broken, Sigurd leans his weary head against the bosom of his aged mother while listening to the song of the Crusaders:

> Fair is the earth,
> Fair is God's heaven,
> Fair is the pilgrim-path of the soul
> Singing we go
> Through the fair realms of earth
> Seeking the way to our heavenly goal.

The second section of Björnson's trilogy was performed at Chicago in 1908. Johan Svendsen's *Sigurd Slembe* is a musical illustration of the drama.

SIKANG, shē'käng', province, China, in the south, comprising part of the Tibetan high plateau and the former southwest section of Szechwan. Sikang is sparsely populated (20 inhabitants per square mile). It is traversed by branches of the Kumlun and Himalaya Mountains, which, unlike most Chinese ranges, run north and south instead of east and west; and along them flow the headwaters of the Yangtze, Mekong, and Salween rivers. Sikang has been called the paradise of new China; but transportation has been exceedingly difficult. Before the highways were built from Szechwan it was almost inaccessible. In 1938 it was enlarged at Szechwan's expense, with several of the latter's cities included in the Sikang boundaries, among them Sichang and Yaan (capital of Sikang in 1950). A provincial government was established in 1939. During the Sino-Japanese War (1937–1945), when new methods of agriculture and modern industries were introduced, this wild virgin land became an important part of free China. There is considerable coal, iron, gold, and salt, and nickel and magnesium have been discovered. But the majority of the people, including Chinese, Tibetans, and tribesmen, engage in farming and animal husbandry. The main agricultural products are rice, millet, potatoes, and wheat. To improve agriculture two canals were built in southeast Sikang in 1944. Area 90,000 square miles; pop. (1952 est.) 2,000,000.

SIKESTON, sīks'tŭn, city, Missouri; in Scott County; altitude 330 feet. It is 30 miles south of Cape Girardeau, on the St. Louis-San Francisco and the Missouri Pacific railroads. It is a cotton center, with compresses, gins, and cottonseed oil plants. It was platted in 1860, and incorporated in 1874. The government is administered by mayor and council. Pop. (1950) 11,640.

SIKHS, sēks (Sanskrit, *S'ishya,* disciple), the name of a religious community in the Punjab, North India, which, in course of time, has become the designation of a people. There are two classes of Sikhs—Sahijdhari, and Kesadhari. The Sahijdhari Sikhs do not accept *pahul,* or baptism by the sword, which implies a ritual in which a two-edged sword is instrumental. The Kesadhari baptized Sikhs dress differently and wind their long hair around a short dagger which serves as a comb. From the Sikhs of today come some of the finest fighting men in the world. The Sikh regiments of the Indian Army were highly esteemed and respected by the British.

History of Sikhs and Sikhism.—The Sikh religion, which enjoins abstinence from tobacco and wine, was founded by Nanak (1469–1539), first of the great Sikh gurus. He was a humanitarian who aimed at combining Hindus and Moslems into one brotherhood. Nanak was a proponent of monotheism, an advocate of perfection and spiritual peace, and a profound thinker far in advance of his time. He abolished caste distinctions, sought to introduce simplicity of faith and purity of morals, and to induce Hindus and Moslems to live in harmony.

The cardinal principles of Sikhism somewhat resemble those of Christianity from which it departs, with other dissemblances, in its belief in transmigration—the passing of the soul at death into another body or successive bodies. Consonant with this, the Sikhs believed that the soul of Nanak lived again in his successors.

Nanak was succeeded by Guru Angrad (1539–1552) who, during his ministry, carried forward the gentle teachings of his preceptor. This pattern was generally observed by the two succeeding gurus, namely: Amar Das (1552–1574) who also discouraged the practice of suttee, the voluntary cremation of a living widow on the funeral pyre of her deceased husband; and Ram Das (1574–1581) who founded the golden temple of Amritsar which to this day remains the center of worship of the Sikhs.

Guru Arjan (1581–1606), the fifth guru, compiled the Sikh's Bible known as the *Adigranth,* which embodies the teachings of Nanak and his successors; of the saints who preceded him; and also perceptive Mohammedan verses. Accused of introducing a new divinity, Arjan was absolved by Akbar, the tolerant Moslem emperor of that time, but was later martyred by Jahangir, Akbar's successor. In consequence, under Mohammedan persecution, the hitherto mild religious Sikhs developed into a militant people in revolt against their Mohammedan rulers.

Har Govind (1606–1645), sixth guru, was a military as well as a spiritual leader. He founded the Sikh army which first challenged the Mogul authorities. He encouraged his followers to abandon vegetarianism, and through that to develop the superior physique that characterizes the Sikhs of today. Their warlike activities were continued against Shah Jahan, successor to Jahangir, whose troops they engaged and defeated. Guru Har Rai (1645–1661), who continued resistance to Islam, was succeeded by Har Krishan (1661–1664) whose short tenure of guru-ship was comparatively uneventful. The next guru, Teg Bahadur (1664–1675), was executed by Aurangzeb, third son of Shah Jahan, for refusing to embrace Mohammedanism.

Guru Govind Singh (1675–1708), the tenth and the most powerful of the Sikh gurus, developed a military regime during which the Sikhs became paramount in northwest India. He repudiated the caste system and ordained that all who would enlist under his banner might become Sikhs through *pahul,* the baptismal ceremonies instituted by him. He adhered to the teachings of Nanak, maintaining that God could be found only in humility and sincerity and wrote the second volume of the scriptures.

The Sikhs became politically independent as a confederacy in 1764, and Sikhism reached its zenith under Ranjit Singh (1780–1839) called "the Lion of the Punjab." He consolidated the federated states into one large state under his rule in 1805. The British power in India kept peace as long as he lived, but after his death wars broke out with the British. There were two such wars, the first in 1845. The struggle lasted with varying fortune and intervals of temporary submission on the part of the Sikhs. The second war broke out in 1848 and ended in the decisive battle of Feb. 21, 1849, when the Sikh power was broken and their territory was annexed to British India. With the outbreak of the Indian Mutiny (1857–1858) the Sikhs assisted materially in suppressing the revolt. It is claimed that their loyalty and valor saved India for the British. Ritualistic observance of Sikhism has abated somewhat, and although all Sikhs hold the *Adigranth* in reverence, the ordinances of Govind Singh are less strictly observed. Many Sikhs of today are almost indistinguishable from Hindus. Their total number is estimated to be around six million. See also INDIA—*Religion and Philosophy.*

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SIKKIM, sĭk'ĭm, state, India, situated in the eastern Himalayas between Nepal and Bhutan, and between Tibet and Bengal; area 2,745 square miles. About 50 per cent of its population are Hindus and 25 per cent are Buddhists, and there are a few Christians. It forms part of the south slope of the Himalayas and ranges in altitude from 18,000 feet in the north to 1,000 feet in the south. Its extreme length from north to south is 70 miles, and its extreme breadth 50 miles. The climate is accordingly varied, ranging from tropical to alpine. Formerly most of the area was covered with forest, but the greater part below 5,000 feet has in recent years been cleared and cultivated. The chief products are maize and rice, oranges, apples, and woolen cloth. A few copper mines are worked. The mountain roads are good, and the route of Indian trade with central Tibet passes through the state.

In 1890 a treaty was signed by the viceroy of India and the Chinese representative, by which the British protectorate over Sikkim was recognized by China. The maharaja, after having declined to comply with the conditions, lived for some time under surveillance in British India, and in 1895 was allowed to return to Sikkim. The maharaja and the members of the council carried on the administration, with the assistance of the British political officer stationed at Gangtok. Sikkim became independent in 1947; in 1949–1950 responsibility for its administration was assumed by India.

The inhabitants are Bhutias, Lepchas, and Nepalese, the last named being now the most numerous. Principal towns are Gangtok, the capital, Rhenok, Rangpo, Pakyong, Lachen and Lachung. Pop. (1951) 135,646.

SIKORSKY, sĭ-kôr'skĭ, **Igor Ivan,** Russian-American aeronautical engineer: b. Kiev, Russia, May 25, 1889. A graduate of the Naval College, St. Petersburg, in 1906, and of Kiev's Polytechnic Institute two years later, he attempted to build a helicopter of his own design (1909). He made world records with a plane of his design in 1911, and in 1912 was chief engineer for an aeroplane construction company. He made a fortune designing Russian war planes in World War I. A White Russian, he fled to the United States after the revolution, became an American citizen (1928), and achieved new international celebrity as builder of American clipper ships, helicopters, and patrol bombers. In 1940 he produced the US-300, the first single main rotor helicopter in the world.

SIKSIKA, sĭk'sĭ-kà (BLACKFEET, by which name they are popularly known), an important tribe and group of allied, Alonquian-speaking Indian tribes of the North American plains, comprising the Siksika proper, the Kainah or Bloods, and the Piegan. The Siksika proper, or North Blackfeet, now live on a reservation near Gleichen, Alberta, Canada See also BLACKFEET INDIANS.

SILAGE, sī'lĭj, or **ENSILAGE,** is moist forage preserved in a succulent state by the ex-

clusion of air whereby it undergoes certain changes. It holds an important place in the feeding of livestock. Silage is generally stored in silos built of wood, tile, brick, stone, concrete, or steel. (See also SILO.)

This method of preserving feed was known for centuries in northern Europe. It became well known there about the middle of the 19th century. It was introduced into the United States in 1875 by Dr. Manly Miles of Michigan, and in 1876 by F. Morris of Maryland. Silage saves feed that otherwise would become inedible if dry or damaged by rain. It is palatable and has high content of carotene. It facilitates early clearance of ground to permit another crop, and ends the hazard of fire from spontaneous ignition of inadequately cured hay. Although silage is an easy form in which to feed forage to livestock, most silage has a low minerals and protein content, and is not suitable for use as a ration.

Conversion of Fodder into Silage.—In the silo the crop temperature rises until all the air in the interstices of the silage is exhausted. The quantity of air governs the rise in temperature which should not exceed 100°F. This maximum temperature is reached within a week. Thereafter, the silage cools slowly and steadily. Persistence of high temperatures indicates the ingress of air. If continued, this will cause the silage to become moldy. High temperature is evidence of a high rate of oxidation which impairs the quality of the silage.

Chemical Changes.—Various chemical changes take place during silo fermentation such as the conversion of sugars, starches, etc., into lactic, acetic, and other acids. After chopping, the plant cells of fresh green crops continue to take in oxygen from the air and to give off carbon dioxide which replaces the oxygen in the air. Provided that there is no more ingression of air the silage should keep indefinitely without molding or rotting. Crops with a low content of protein and calcium, such as corn, sorghums, and small cereal grains, when siloed alone or with not more than an equal weight of legumes, will develop enough acid to make them good silage. Crops with a high content of protein and calcium, such as the legumes or immature grasses, should have molasses or acid added, or should be wilted. Grasses harvested at the usual hay-making stage, provided they are not wet with dew or rain, need no special treatment. If wet, molasses should be added, or the excess moisture evaporated. A certain spoilage occurs that cannot be avoided, namely: that which occurs at the top of the silage. Tight sides and careful sealing around the doors of tower silos should prevent further spoiling.

Crops Suitable for Silage.—Corn is the most common silage crop wherever it can be grown successfully. Sorghums are suitable for silage and all legumes, including alfalfa, clovers, cowpeas, soybeans, lespedezas, and others even though they differ widely in physical characteristics, in chemical composition, and in yield, as well as palatability. Vines from pea-canning factories as well as corn-canning refuse, beet tops and crowns make silage of fair quality. In some localities sunflowers yield a much greater tonnage than corn. Beet pulp, apple pomace, wet brewers' grain, sugarcane, Napier grass, and weeds of various kinds are occasionally used for silage with fair success. Various crops suitable for silage need various forms of special treatment based on experience and scientific knowledge regarding moisture content, seepage, preservatives, and fermentation.

Silage Cutting.—Most silage is cut into pieces not over half an inch long; but all hay and small grain crops should be cut as fine as possible. Field-chopping, a method of silo filling now in vogue, although costly, is the easiest known. The standing corn is both harvested and chopped by a machine drawn by a tractor and operated by power from the tractor. The cut corn is mechanically delivered to a wagon box drawn alongside. Hauled to the silo, the cut is pushed off into a blower which elevates it into the silo.

Composition of Silage.—In general the chemical composition and nutritive value of silage are similar to that of the green crop from which it is made. The composition and digestible nutrients of certain forages—green, as silage, and dried, are indicated in the following table:

Forage crop	Composition of the forage: Moisture	Ash	Crude protein	Ether extract (fat)	Crude fiber	Nitrogen-free extract (sugars, starches, etc.)	Digestible crude protein in the forage	Total digestible nutrients in the forage	Total digestible nutrients in the dry matter
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Alfalfa, in bloom, green	77.2	1.8	3.2	0.6	7.8	9.4	2.4	12.9	56.7
Alfalfa silage	68.9	2.7	5.7	1.0	8.8	12.9	4.0	18.8	60.6
Alfalfa hay	7.2	8.0	15.4	1.6	30.3	37.5	10.8	52.3	56.4
Red clover, in bloom, green	70.8	2.1	4.4	1.1	8.1	13.5	2.9	19.4	66.4
Red clover silage	72.0	2.6	4.2	1.2	8.4	11.6	1.3	12.1	43.0
Red clover hay	7.0	10.0	16.1	2.6	23.6	40.7	9.7	49.5	53.2
Soybeans, green	73.9	2.9	4.0	1.1	7.6	10.5	3.2	16.0	61.1
Soybean silage	75.6	2.6	2.4	.8	9.6	9.0	1.6	13.1	53.5
Soybean hay	8.4	8.9	15.8	3.8	24.3	38.8	11.2	55.6	60.7
Timothy, in bloom, green	61.6	2.1	3.1	1.2	11.8	20.2	1.5	22.9	59.5
Timothy silage	60.3	2.8	4.4	1.4	13.0	18.0	2.3	23.8	59.8
Timothy hay	7.1	5.8	7.5	2.9	30.2	46.5	3.5	52.5	56.5
Corn fodder, dent, green	73.4	1.5	2.0	.9	6.7	15.5	1.3	19.3	72.7
Corn silage	70.9	1.4	2.4	.9	6.9	17.5	1.1	19.8	67.9
Corn fodder, dry	11.8	5.8	7.4	2.4	23.0	49.6	3.4	55.3	62.7
Sorgo, green	77.3	1.3	1.5	1.0	6.2	12.7	.6	15.3	67.2
Sorgo, silage	74.7	1.4	1.6	1.0	6.9	14.4	.4	15.3	60.5
Sorgo fodder, dry	11.6	6.0	5.3	2.4	26.0	48.7	3.3	58.2	65.8

Compiled in the Division of Animal Nutrition, Bureau of Animal Industry.

Feed Value of Silage.—Silage has a feeding value 30 to 40 per cent as much as that of good hay. Only rarely is it used to the exclusion of hay, straw, or stover. Its outstanding characacteristics are its palatability, its consumption without waste, and its carotene content which is valuable to supplement grain and low-quality hay in the ration. Corn, sorghum, small grain, or grass silage contain insufficient protein and mineral matter for growth and milk production; they must be supplemented with some feeds to supply these deficiencies.

SILAGE IN CANADA

Records indicate that silage production in Canada goes back about 75 years. Corn was probably the first crop grown for silage and it is still the most popular in areas where it grows successfully. Under conditions too cool for good growth of corn, sunflowers have been used for silage. Yields are usually better than those of corn. While sunflower silage is less palatable than corn silage, cattle soon become accustomed to it.

In recent years there has been a substantial increase in the amount of grass and legume silage made in Canada. This has developed not at the expense of corn but rather as an alternative to hay in areas where grasses and legumes grow luxuriantly, but where weather conditions make it difficult to cure hay. Added impetus has been given by the popularity of the so-called horizontal silo, constructed above ground with wooden side walls. Compared with the conventional tower silo, the horizontal silo is much cheaper to build, can be filled and packed easily by mechanical means, and is adapted to self feeding by using racks at both ends. Spoilage losses are about the same as with tower silos.

The common grasses and legumes grown for hay are all being ensiled successfully alone or in various combinations, with and without the addition of preservatives such as molasses. Mechanized equipment enables farmers to handle large acreages with relatively little labor. In some areas grass silage production has increased more than twenty-fold in the past few years.

SILAO, sē-lä'ō, town, Mexico, in the state of Guanajuato, situated on the Mexican Central Railroad, 15 miles southwest of Guanajuato. It is at the junction of the branch line to the state capital. Situated at the base of the Cerro del Cubilete, it borders a rich farming area. There are cotton and woolen manufactures. A few miles distant are the hot springs, Aguas Terminales de Comanjilla. Founded in 1537, Silao has 18,463 inhabitants (1950).

SILAS MARNER, a brief novel written by George Eliot (Mary Ann Evans) in 1861, has always been one of the most popular as it is among the greatest of its author's works. The scene of the story is laid in the typical English village of Ravelow, at a time "when the spinning wheels hummed busily in the farmhouses." Against a picturesque and realistic background of rural life and custom George Eliot has set the strange and alien figure of the weaver, Silas Marner, who has come hither as an outcast from a narrow religious community in the city, where he has been unjustly convicted of robbery. Utterly broken in spirit, bankrupt of his simple faith, and cut off from all kindly human interests he becomes a miser, cherishing the ever-growing heap of his earnings at the loom as the sole object of his starved affections. When his gold is stolen by the vicious Dunstan Cass, younger son of the village squire, his life is left utterly barren and he becomes practically insane. At this crisis the abandoned wife of Godfrey Cass, Dunstan's elder brother, perishes in the snow before Marner's hut, and his child, Eppie, is found by Marner and welcomed as a providential gift sent to replace his stolen gold. The theme of the novel is the transformation in Marner's life, the restoration to his simple and affectionate soul which comes with this substitution of a human love, demanding care and sacrifice for the miser's perverted love of gold. Interwoven with the story of Silas is that of Godfrey Cass, the good-hearted but weak and badly brought up father of Eppie, who pays for his unwillingness to accept the consequences of his unworthy marriage, by seeing Eppie, now grown to womanhood, adhere to her foster-father even when Godfrey and his second wife, Nancy, at last tell her the truth about her parentage and would gladly welcome her to their childless home.

The story is as beautiful as it is significant. The variety of the characterization, the consummate handling of the narrative, and the profound moral insight of the author make this novel an unquestioned masterpiece of 19th century English fiction.

James H. Hanford.

SILAY, sē–lī', municipality, Philippine Islands, in Negros Occidental Province, on Guimaras Strait, 10 miles north of Bacolod. It is a large and prosperous town open to coasting trade, and is a telegraph and military station. Pop. (1948) 39,483.

SILCHESTER, sĭl'chĕs-tẽr, village, England, in Hampshire, seven miles north of Basingstoke, of special archaeological interest. Here are the ruins of Caer Segeint, or Calleva Atrebatum, a Roman town, the main features of which are an amphitheater, and the city walls, 2,760 yards long. The foundations of a basilica, forum, baths, and a temple have also been excavated, and rings, coins, seals, broken pottery in abundance have been found near the surface. Antiquarians have given the place much study. Excavations were begun by Joyce in 1864 but it was not until 1889, when the Society of Antiquaries took up the work, that the excavations were systematically carried out. By 1909 nearly all the ancient town had been uncovered, disclosing very many interesting remains. All portable objects now repose in the Reading Museum.

SILENE, sī-lē'nê, a large, widely distributed genus of the pink family (Caryophyllaceae), having opposite leaves, and five-merous flowers, with a more or less inflated calyx. The silenes are either annual or perennial and of varying habit and inflorescence. Many species are viscid pubescent, as *Silene virginica, S. caroliniana,* and *S. viscosa,* the last the catchfly, which is carnivorous to a slight degree and holds its victims by its stickiness. In general, however, the viscid stems prevent crawling insects, such as ants, from stealing honey and both common and generic names refer to this characteristic. *Silene nutans* and *S. noctiflora* are now naturalized in America and are faded and unattract-

ive in the daytime, but are in full bloom, with starry white petals at night, attracting night-flying insects by their fragrance. Another naturalized silene, found at the borders of fields, is the *S. vulgaris,* a glaucous tall plant, known as bladder campion, cowbells, behen, and spattling or frothy poppy. The first two names refer to the inflated calyx, which is much more conspicuous than the white notched petals protruding from the top, and in fruit is nearly globose, nodding in cymose panicles. It is of papery texture, tinted pale green flushed with rose and is reticulated with delicate veinings. It is said that English peasants have eaten its young shoots, tasting like green peas, instead of asparagus. The moss-campion (*S. acaulis*), a tufted perennial covered with reddish purple flowers, is common to Arctic regions and mountains; the sweet-william catchfly (*S. armeria*), with rose-colored flowers; and the fire pink (*S. virginica*), whose crimson flowers blaze in southern dry woods, are all cultivated, to which the northern wild pink (*S. caroliniana*) might well be added, as it has many rose-colored or white flowers in very early spring.

SILENT CHAIN, an improved form of link-belting consisting of a broad band of metal links the ends of which project inward of the belt circuit forming cog-shaped teeth which engage in a broad-faced toothed gear wheel. This chain belt has the advantage of working perfectly where the pulley shafts are necessarily close together, and are especially adaptable in the transmissions in automobile machinery. They have the additional advantage of being practically noiseless. See Power Transmission.

SILENT PARTNER, called at various times and places a dormant, sleeping or special partner. In commercial phraseology a member of a firm or corporation whose name does not appear publicly in the concern, but who shares the responsibilities and liabilities of the organization. Generally a partner of this sort takes no active part in the management of the business, outside of giving monetary support or receiving his portion of the profits. See Partnership.

SILENUS, sī-lēn'nŭs, represented in ancient mythology as the mentor and companion of Bacchus, the god of wine. Silenus, according to the legend, was generally drunk himself. He is sometimes represented as treading out grapes and other times as riding on an ass with the infant Bacchus in his arms. Various legends about him were current in antiquity especially in Asia Minor, where his worship first took concrete form. Consult 'Dictionary of Greek and Roman Mythology'; and 'Gruppe, Otto, 'Grieschische Mythologie und Religionsgeschichte' (2 vols., Munich 1906).

SILESIA, sī-lē'shĭ-a (German Schlesien), a former Bohemian duchy, later divided between Prussia and Austria, again divided in 1919 with Austrian Silesia and a small area of German Silesia assigned by World War I peace treaties to newly created Czechoslovakia, and a larger section of German Silesia assigned to Poland. Yet the greater part of Silesia remained part of the Reich. Germany's seizure of Czechoslovak Silesia in 1938 and her conquest of Poland in 1939 brought all Silesia (15,569 square miles) under German rule for the period of World War II.

Silesia is drained by the Oder flowing southeast to northwest. West of the valley are the eastern Sudetic Mountains. East of the Oder the land rises in several more or less isolated and hilly, but not high, plateaus. Nearly nine-tenths of the forests are coniferous. The region is rich in mineral resources. Its coal deposits are among the richest in Europe. Iron and zinc are mined in large quantities and lead and silver are also found. An average annual production of coal in normal years is 40,000,000 metric tons; of zinc, 600,000 metric tons, while of iron and lead considerably less quantities are produced. The climate in the lowlands is favorable for agriculture and the valley of the Oder is very fertile and one of the richest wheat and barley regions in the empire. Oats, rye, buckwheat, potatoes and fruit are also raised in large quantities and there is some viticulture. The textile industry is the most important, next to which follow the metal industries and others depending on mining and quarrying, such as the manufacture of cement, porcelain and glass. Lumbering and the manufacture of paper, beet-sugar, starch and liquors are also important. About 1,600,000 people depend on agriculture for a livelihood, while 1,750,000 are engaged in industrial occupations. Besides the main Oder there are scarcely any navigable waterways. There are about 2,500 miles of railroad. The capital is Breslau (554,-801), which is also the principal industrial centre. Lower Silesia has an area of 10,276 square miles and a population of 3,132,198. Upper Silesia has 3,746 square miles with a population of 1,379,408. Other populous centres are Gorlitz (91,702), Konigshutte (72,000), Beuthen (86,881), and Liegnitz (73,000). The bulk of the population is Roman Catholic.

Former Austrian Silesia was a crownland and duchy situated between the southern part of Prussian Silesia and Moravia and bounded on the southeast by Galicia and Hungary. It measures 115 miles from northwest to southeast, with a breadth of 20 miles and an area of 1,987 square miles. The northwestern part belongs to the Sudetic Mountains, the southeastern to the Carpathians, and in the middle is the transverse valley of the Oder. The chief mineral products are coal and iron, the coa amounting to about 7,500,000 tons annually. Agriculture is confined to the central lowlands and yields grain, sugar-beets and fruit. The industries are more important; there are machine shops, steam textile mills, beet-sugar factories, distilleries, etc. There is a considerable transit trade in Austrian wines, salt and also in beef. Pop. 756,949. Of these 639,000 are Roman Catholics and 102,-000 Protestants. German is spoken by 48 per cent of the people, Polish bv 33 per cent and Czech by 29 per cent. Troppau, the capital, has 31,000 inhabitants. Other cities are Ostrau (22 000), Teschen (22,000) and Bieletz (18,000).

In the 10th century Silesia was incorporated with Poland. In the latter part of the 12th century it was made a separate duchy. In the 13th century the duchy was divided into numerous principalities. By the middle of the 14th century these had become actual vassals of the Bohemian king, and in 1526 they passed to the house of Hapsburg. In 1675 Frederick William, of Brandenburg, laid claim to Silesia. The emperor refused to recognize the claim and

the three Silesian wars followed, which ended in 1763 with the supremacy of Prussia over what later became Prussian Silesia. During the World War I, Austrian Silesia was invaded by the Russian armies. Under the Peace Treaty of 1919, the Czech section of Silesia (area, 1,988 square miles; pop. 756,949) was assigned to the Czechoslovak Republic while Upper Silesia was reserved for a plebiscite. In March 1921 a plebiscite was held in Upper Silesia which resulted in a majority for remaining in Germany. The Poles within the area rebelled and civil strife ensued for several months, France conniving with the Polish insurgents and Great Britain leaning to the German side. The warring factions were at last persuaded to suspend hostilities and the question was referred to the Allied Supreme Council. It met in Paris Aug. 8-12, 1921 and, failing to agree, referred the question to the Council of the League of Nations. A commission was appointed, and its decision, made public on Oct. 20, 1921, divided the plebiscite area in nearly equal parts between Poland and Germany.

The greater part of Czechoslovak Silesia was ceded to Germany as a consequence of the Munich settlement of Sept. 29, 1938. A month later, on November 1, Czechoslovakia signed an agreement yielding to Poland an area of 419 square miles with a population of 241,698. Then, in 1939, when Germany conquered Poland and seized Czechoslovakia, all Silesia came under Reich domination. The Allied victory in World War II brought about restoration in 1945 of Germany's Silesian conquests; but determination of new boundaries for Prussian Silesia had to await the peace treaty.

SILHOUETTE, sĭl-oo-ĕt', is the representation in solid black of the outlines of an object, occasionally with a few assisting lines drawn in white. The name comes from Etienne de Silhouette, French Minister of Finance in 1759. He strove by severe economy to remedy the evils of a war which had just terminated, leaving the country in great exhaustion. At the end of nine months he was obliged to leave his place. During this period all the fashions in Paris took the character of parsimony. Coats without folds were worn; snuff-boxes were made of plain wood; and, instead of painted portraits, outlines only were drawn in profile. All these fashions were called *à la Silhouette;* but the name remained only in case of the profiles.

SILICATES, a great group of minerals. compounds of various elements with silica. The group includes a few important ores but is chiefly significant as the great group of rock-forming minerals. A discussion of the important minerals of this group will be found in the introduction to the article on rocks. See also FELDSPAR; AMPHIBOLE, etc.

SILICIFIED WOOD, a variety of the minerals quartz or opal in which the mineral has replaced the wood. Opalized wood is wood changed into opal; petrified wood includes either of the above as well as wood changed into coal (see PALÆOBOTANY). According to J. D. Dana the trees now silicified in Arizona seem originally to have flourished on the shores of an inland lake, into which they fell and became water-logged; then they were buried beneath volcanic material of a highly silicious character which underwent alteration through the action of water setting free more silica than the water could hold in solution. As the wood decayed this silica was deposited in its cells until finally the woody fibre completely disappeared and what was once wood became quartz. As this change took place only particle by particle, the minutest cells of the wood are preserved and may be seen under the microscope. In the great petrified forests of Arizona, now a government park, there are trunks of trees three or four feet in diameter and over 100 feet in length, completely changed to quartz. Over the whole section are scattered petrified trunks and fragments from the size of a hickory-nut to several feet in diameter. At one place in the park a petrified tree has fallen across a ravine about 50 feet wide, forming a natural bridge. This Arizona petrified wood has been extensively exhibited and sold under the trade names of "jasperized wood," "agatized wood" and "woodstone," having been manufactured into tiles, paper-weights, cane and umbrella handles and many novelties, while complete transverse sections have been mounted as table-tops. The material is partly jasper, richly colored red and yellow by the oxides of iron and partly translucent chalcedony, with occasional spots of clear quartz and amethyst. Silicified wood abounds in the Rocky Mountains, while a similar forest exists in the Yellowstone Park. Opalized wood is also common, especially in California and Oregon. Consult Merrill, 'Fossil Forests of Arizona' (1911). See FOSSILS.

SILICIOUS SINTER. See GEYSERITE.

SILICON, *in chemistry,* one of the non-metallic elements, symbol Si, atomic weight 28.4. Next to oxygen it is the most abundant element found in the earth. It does not occur in nature in the free state but in combination with oxygen (silica) and with oxygen and various metallic elements as potassium, sodium, aluminium, calcium, etc., in the form of silicates. Silicon may be prepared by heating a mixture of metallic sodium and the double fluoride of sodium and silicon ($Na_2SiF_6+Na_4$= $6NaF+Si$); also by action of heat on a mixture of magnesium and silica (sand). It exists in three allotropic forms, an amorphous brown powder, a graphitoidal and a crystalline variety. The amorphous form is insoluble in all acids except hydrofluoric; it dissolves in potassium hydroxide to form a silicate, and burns in the air at high temperatures to SiO_2. The crystalline variety is very hard, is but little if at all attacked by hydrofluoric acid or potassium hydroxide and cannot be burned. Silicon forms compounds with oxygen, sulphur, chlorine and some others but the most important are the oxide SiO_2 and the salts derived from the various silicic acids.

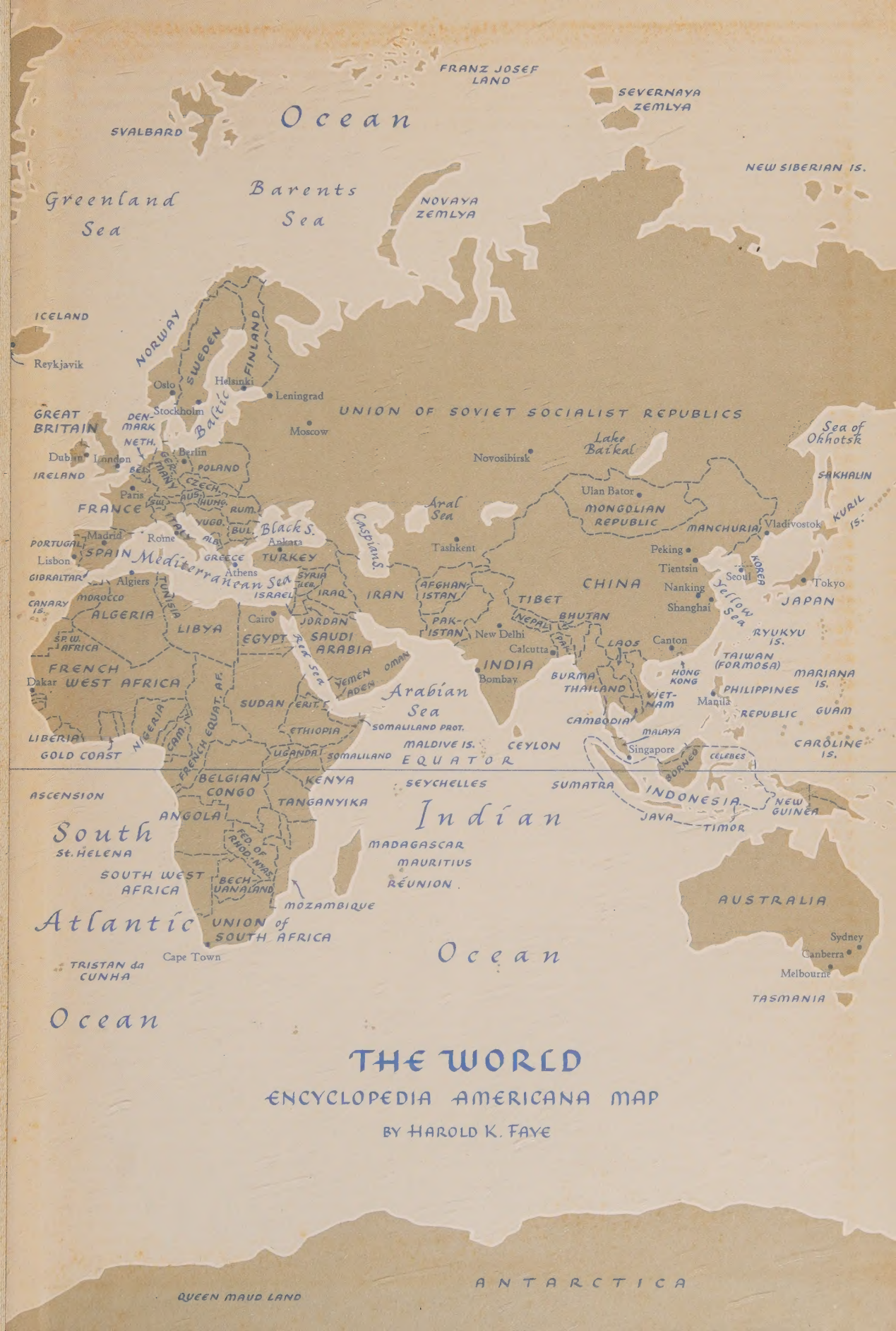
Silica, SiO_2, oxide of silicon, occurs very abundantly in nature both in crystalline and amorphous forms. Quartz, a very pure form of silica, crystallizes in six-sided prisms terminated by six-sided pyramids. The finer crystals of quartz are called rock crystal, while the imperfectly crystalline varieties occur in a number of forms. Of the cryptocrystalline and amorphous forms we have opal, agate, amethyst, flint, sand, etc. Silica can be obtained in a fine

state by melting sand or a silicate with sodium carbonate whereby a silicate of sodium is formed. This is dissolved in water and hydrochloric acid added. Silicic acid separates in a gelatinous condition. The whole is evaporated to dryness, heated for a time a little above the boiling point of water and then washed with dilute hydrochloric acid. The silica is left behind as a gritty white powder insoluble in water and in most acids. Hydrofluoric acid dissolves it, however, with the formation of silicon tetrafluoride (SiF_4). It also dissolves in alkalies to form silicates. Silica is not acted on by heat except that of the oxyhydrogen blowpipe which fuses it. Silica, generally in the form of sand, is used largely in the preparation of mortar, glass and pottery. In metallurgical operations it is used as a flux with ores containing limestone with which it forms a glassy slag which floats on the molten metal carrying with it many impurities from the ore. Silica forms a number of hydrates which have acid properties and from which a vast number of salts are derived. A great many very complex salts of these silicic acids are found in the earth's crust, the metallic elements being usually sodium, potassium, magnesium, aluminium, calcium and frequently small amounts of other elements. Some of the best known silicates are the minerals feldspar, mica, garnet, talc, meerschaum, etc. Clay is largely a silicate. See Quartz; Electrochemical Industries.

SILICON CARBIDE. See Electrochemical Industries.

SILIUS, Titus Catius Italicus, Roman poet: flourished about 25–101 A.D. At Rome he applied himself to the bar, and became a celebrated orator and advocate. He was consul at the time of Nero's death and incurred some reproach for assisting in that tyrant's prosecutions, but acquired honor from his conduct in the proconsulate of Asia, assigned to him by Vespasian, from which he retired into private life, and collected books, statues and busts of eminent men. He finally retired to his seat in Campania, where he died. The only work of Silius which has reached modern times is an epic 'Punica' in 16 books, written with more diligence than genius. It takes as its theme the Second Punic War, according to Livy and Polybius, and contains occasional splendid passages; the description of the passage of Hannibal across the Alps is particularly admired. There are editions by Drakenborch (1717), Ruperti (Göttingen 1795–98, two vols.), and Bauer (Leipzig 1891–92). Consult Butler, H. E., 'Post-Augustan Poetry' (Oxford 1909) and Schanz, Martin, 'Geschichte der römischen Litteratur' (Vol. II, pt. 2, 3d ed., Munich 1913).

ELLESMERE I.
Arctic
Baffin Bay
GREENLAND
WRANGEL I.
VICTORIA I.
BAFFIN I.
USSR
SIBERIA
ALASKA
Nome
Godthaab
Hudson Bay
Bering Sea
Juneau
North
KAMCHATKA PENIN.
CANADA
ALEUTIAN IS.
Vancouver
Montreal
Ottawa
Toronto
Quebec
St. John's
North Pacific
Chicago
Atlantic
UNITED STATES
New York
San Francisco
Denver
Washington
AZORES
Ocean
Los Angeles
New Orleans
Houston
BERMUDA
Ocean
MIDWAY IS.
Gulf of Mexico
MEXICO
BAHAMAS
Havana
Honolulu
HAWAII
Mexico City
CUBA
HAITI
WAKE I.
BR.HON.
VIRGIN IS.
DOM.REP.
PUERTO RICO
HON.
Caribbean
GUATEMALA
EL SALVADOR
NIC.
Sea
Caracas
MARSHALL IS.
CLIPPERTON
COSTA RICA
VENEZUELA
PANAMA
COLOMBIA
Bogotá
GUIANAS
GILBERT IS.
EQUATOR
GALÁPAGOS IS.
Quito
ECUADOR
SOLOMON IS.
ELLICE IS.
MARQUESAS IS.
PERU
BRAZIL
Lima
SAMOA
La Paz
NEW HEBRIDES
TUAMOTU ARCH.
BOLIVIA
FIJI IS.
Sucre
Rio de Janeiro
PARAGUAY
NEW CALEDONIA
SOCIETY IS.
Asunción
São Paulo
PITCAIRN I.
South Pacific
CHILE
Santiago
URUGUAY
Tasman Sea
Buenos Aires
Montevideo
NEW ZEALAND
Wellington
ARGENTINA
Ocean
FALKLAND IS.
N
TIERRA del FUEGO
S. GEORGIA
S. ORKNEY IS.
S. SHETLAND IS.
PALMER PENINSULA
Weddell Sea
ANTARCTICA
MARIE BYRD LAND



THE WORLD

ENCYCLOPEDIA AMERICANA MAP

BY HAROLD K. FAYE